New Collected Works by

# ROBERT A. HEINLEIN

# REQUIEM

## and Tributes to the Grand Master

"I've read (and cried over) REQUIEM—a fine memorial."
—Arthur C. Clarke

Edited by Yoji Kondo

"86,000 words of Robert Heinlein never been in book form before. This is a real treasure for all of Robert Heinlein's children."
Greg Bear

# Requiem

## new collected works by Robert A. Heinlein and tributes to the grand master

Portions of this work are fiction. All the characters and events in these portions are fictitious, and any resemblance to real people or events is purely coincidental.

REQUIEM

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# Preface

The year was 1910. In Kansas City a ten-year-old youngster took his three-year-old brother into the backyard to see Halley's Comet. Unlike the disappointing reappearance a few years ago, the comet made a brilliant sight, with its tail flaring across the entire sky. The sight made a lasting impression on the younger boy, one that lasted all his life.

It was his introduction to what would become a lifelong interest in astronomy, an interest expressed in a number of ways. The child would always long to go to the stars. Of course, in 1910 such a trip was unthinkable, but he longed to go in that direction. Perhaps some day …

By the time he was in his early teens, Robert Heinlein had read all the books in the Kansas City Public Library on the subject of astronomy. He was in some small demand as a lecturer on the subject. He had built himself a small telescope, and observed the moon and stars from theroof of his parent's home.

But the demand for astronomers has never been very great. A few aficionados can find work teaching, and with some luck, they will share time on the large observatory installations. Otherwise the would-be astronomer must remain an amateur.

Perhaps attracted by the Michelson experiment which measured the speed of light, done at the United States Naval Academy, and also by the example of his next elder brother, Robert decided that that was the place for him. The Navy also had an Observatory in Washington, D.C., and it might be that he could find satisfactory work there -- someday.

Robert began reading science fiction early -- the Kansas City Library stocked books by Verne and Wells, as well as the Tom Swift books. He read everything he could find in this field; eventually he found a magazine on the stands -- Hugo Gernsback's *Electrical Experimenter*. He hungrily read each issue, and even went so far as to purchase the latest issue to read on the train when he returned from Colorado, where he had gone on a mountain climbing trip, instead of getting food for the journey.

He became oneof the earliest members of the Rocket Society at a

time when it consisted only of dreamers.

Navy life did not allow much time for dreaming -- at sea watches were four hours on, eight hours off, study time for promotion examinations took up some hours daily, and logs of various sorts must be kept. Still his interest in astonomy continued, and he bought all the books on that subject that were published.

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Floundering around after an early retirement from the Navy, Robert tried various ways to earn a living. Attracted by a magazine advertisement for a contest for stories by someone who had not been previously published, he bought some paper for his typewriter and wrote "Life-Line." When it was finished he read it again, then decided it was too good for the magazine it had been written for, so he sent it off to the leader in the field – Astounding Science Fiction. During those Depression days, with a mortgage to be paid off, the closest Robert could come to his dreams of becoming a space scientists or astronomer was to write about it. So he wrote out his dreams, selling them for money to pay the mortgage.

He had, finally, found a way to earn a living without ruining his health again. And it could involve his beloved astronomy. John W. Campbell, Jr. was also interested in the same subjects and encourages speculation about them. He stimulated Robert into looking into other fields of science, writing stories about those. Robert's interests were wide, including sociology, psychology, sex and politics – anything which included interaction between people, or people and their government.

So writing just suited him – it allowed time to study – time to write speculating about various fields, all couched in terms of fiction. There was a market there, albeit small, consisting of the few readers of science fiction magazines. Paperback publishing did not exist at that time in the United States.

Robert's stories blazed across the infant field of science fiction like Halley's Comet. He fast became the leading writer in the field. Any subject that attracted him became story material. He collected small curious items from magazines and newspapers, and investigated such varied fields as magic, which had been another interest of his since boyhood.

Many of his stories showed his engineering background; he did studies for many of those stories. He would calculate orbits for his spaceships, drawing charts to show time and distance coordinates. He sketched machinery used in stories. Everything he wrote was as

accurate as possible within the time frame of the date on which it was written.

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Science fiction ages badly. Today's engineering and science may be superseded tomorrow. If a science fiction story is to be readable for any length of time, the story itself, not the science, must engage and hold the readers' attention. The story is the real reason why some of those stories last. People continue to read outdated stories because of their interest in the characters or their actions – not to learn something about the science of that day. To overcome this difficulty the author can go so far into the future that no one living today will ever know that the science is incorrect, or he can go back into the far past and attempt to reconstruct something that happened then. Any time frame between the two runs the chance of becoming outdated – perhaps before it sees print.

Robert's stories about a first trip to the moon have been outdated for more than twenty years, yet they are still read. *Rocket Ship Galileo* is a story about an alternate trip to the moon which was possible in its day, but the first trip to the moon did not happen that way; *Destination Moon* was based loosely on that story. The novelette, "Destination Moon," was written because an editor asked for it.

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We worried about the problem of outdating until we finally came to the conclusion that it would be impossible always to update old stories – let them stand as story alone – write new stories and let the old ones stand or fall as might happen.

An interesting facet of Robert's writing is his versatility. He was always trying new techniques, new genres, and new fields of inquiry. He write in many genres – detective stories, horror, sword and sorcery, fantasy, as well as what he is best known for – science fiction. There were also a number of stories he wrote for younger readers, including several in this book.

But of all these story types, he liked best writing science fiction

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Also included in this book are some of Robert's speeches. These have been mildly edited for smoother reading.

The juvenile editor at Scribner's laughed when Robert told her that he would do a girls' book for her. She did not believe that he could possibly do anything acceptable; he took this as a challenge, and sold several stories to teenage magazines for girls. Two of those stories are

here – "The Bulletin Board" and "Poor Daddy."

"Tenderfoot in Space" was written for *Boys' Life* at the request of the editor. It has not been reprinted until now. One of the projects which Robert had in mind for a long time was to complete a book of stories for much younger readers than those to whom he wrote his juvenile books. This project never came to fruition.

"Shooting 'Destination Moon' " was commissioned by John W. Campbell, Jr. in 1950, detailing of some of the difficulties in making the motion picture as accurate as possible. Gregg Press reprinted this article and the "Destination Moon" novelette in 1979, together with some stills from the motion picture and some of the publicity stories about it.

While Robert's speeches at World Conventions have had some circulation through tapes made at those conventions, little is known of his speech given at the French Embassy Theater in Rio de Janeiro in 1969. This speech has never seen print before. The occasion was a film festival to which a number of science fiction writers were invited as guests of the Brazilian government.

This talk was given as an introduction to a screening of the motion picture *Destination Moon*. It is Robert's tribute to Irving Pichel, who made great efforts to keep the motion picture as honest as possible despite the enormous pressures of Hollywood. *Destination Moon* began the long cycle of science fiction pictures as they are shown in films today.

Robert's deep interest in astronomy and space travel continued throughout his life. He visited White Sands to see the last of the German V-2 rockets go up, travelled to Flagstaff to Percival Lowell's observatory; he went to Cape Canaveral, the Downey installation of Rockwell International, the Michoud plant outside New Orleans – anything to do with rockets; he went to JPL to see the pictures sent back by various explorer shots to Venus, Mars and the "Grand Tour."

There was an endless flow of periodicals and books which were orderd, and arrived, in his study. Books and magazines on every branch of science known to man came in, were read, and joined his almost encyclopedic knowledge. At one time he had five different sets of the *Encyclopaedia Britannica*, a facsimile of the first edition, the vaunted eleventh edition, two different sets of the fourteenth edition and *EBIII*. In order to keep up with the flood of advancing knowledge following World War II, Robert read continuously in the fields of science, and got to know many of the advanced thinkers of his day. Papers came in, too, until finally, it became impossible to keep up with all that was being done in the various fields of the sciences.

During the 1970s, he devoted two full years to widespread reading in the fields of biological sciences and the hard sciences, physics, chemistry, astronomy, earth sciences and so on. The time was devoted to reading in depth about those fields, and during that time, he wrote only two short articles – "Dirac, Anti-Matter and You" and "Are You a Rare Blood?" Thereafter, he returned to his writing of science fiction.

In this volume, the reader can catch glimpses of Robert's personality in his fiction and more in his speeches. But more insights may be obtained by reading about what his friends and colleagues thought about his writing and his life.

Virginia Heinlein

Atlantic Beach, Florida

# Editor's Foreward

Robert Anson Heinlein departed from this world on the eighth of May 1988. This volume grew out of the special event, "Heinlein Retrospective," which was held on the sixth of October 1988 at the National Air and Space Museum in conjunction with the posthumous award of the NASA Medal for Distinguished Public Service, the highest civilian honor accorded by the National Aeronautics and Space Administration in recognition of an individual's contribution to the space program.

The title of this book has been taken from Heinlein's beautifully touching novella "Requiem."

Part I contains the works of Heinlein that are unavailable now in print (with the exception of "Requiem"), although the overwhelming majority of his writings are currently in print, reflecting the public's insatiable desire to read Heinlein. One of the short stories, "The Bulletin Board," has never been published elsewhere.

Part II consists of the proceedings fo "Heinlein Retrospective" at the Air and Space Museum, including the speeches made by the panelists and special guests, all but one (an astronaut) of whom are prominent authors. Part III comprises the appreciations written by Robert Heinlein's friends, most of whom are again celebrated science fiction writers of our time.

I hope you will enjoy reading this book as much as I had pleasure in putting it together with the gracious help of Mrs. Robert A. Heinlein.

Yoji Kondo

# P A R T I

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# Works of
# Robert A. Heinlein

# Requiem

*On a high hill in Samoa there is a grave. Inscribed on the marker are these words—*

*"Under the wide and starry sky*

*Dig my grave and let me lie*

*Glad did I live and gladly die*

*And I lay me down with a will!*

*"This be the verse which you grave for me:*

*'Here he lies where he longed to be,*

*Home is the sailor, home from the sea,*

*And the hunter home from the hill.'"*

*These lines appear another place — scrawled on a shipping tag torn from a compressed-air container, and pinned to the ground with a knife.*

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It wasn't much of a fair, as fairs go. The trottin' races didn't promise much excitement, even though several entries claimed the blood of the immortal Dan Patch. The tents and concession booths barely covered the circus grounds, and the pitchmen seemed discouraged.

D.D. Harriman's chauffeur could not see any reason for stopping. They were due in Kansas City for a directors' meeting, that is to say, Harriman was. The chauffeur had private reasons for promptness, reasons involving darktown society on Eighteenth Street. But the Boss not only stopped, but hung around.

Bunting and a canvas arch made the entrance to a large enclosure beyond the race track. Red and gold letters announced:

This way to the MOON ROCKET!!!!

See it in actual flight!

Public Demonstration Flights

Twice Daily

This is the ACTUAL TYPE used by the

First Man to reach the MOON!!!

YOU can ride in it!! — $50.OO

A boy, nine or ten years old, hung around the entrance and stared at the posters.

"Want to see the ship, son?"

The kid's eyes shone. "Gee, mister. I sure would."

"So would I. Come on." Harriman paid out a dollar for two pink tickets which entitled them to enter the enclosure and examine the rocket ship. The kid took his and ran on ahead with the single-mindedness of youth. Harriman looked over the stubby curved lines of the ovoid body. He noted with a professional eye that she was a single-jet type with fractional controls around her midriff. He squinted through his glasses at the name painted in gold on the carnival red of the body, *Care Free*. He paid another quarter to enter the control cabin.

When his eyes had adjusted to the gloom caused by the strong ray filters of the ports he let them rest lovingly on the keys of the console and the semi-circle of dials above. Each beloved gadget was in its proper place. He knew them — graven in his heart.

While he mused over the instrument board, with the warm liquid of content soaking through his body, the pilot entered and touched his arm.

"Sorry, sir. We've got to cast loose for the flight."

"Eh?" Harriman started, then looked at the speaker. Handsome devil, with a good skull and strong shoulders — reckless eyes and a self-indulgent mouth, but a firm chin. "Oh, excuse me, Captain."

"Quite all right."

"Oh, I say, Captain, er, uh —"

"McIntyre."

"Captain McIntyre, could you take a passenger this trip?" The old man leaned eagerly toward him.

"Why, yes, if you wish. Come along with me." He ushered Harriman into a shed marked OFFICE which stood near the gate. "Passenger for a check over, doc."

Harriman looked startled but permitted the medico to run a stethoscope over his thin chest, and to strap a rubber bandage around his arm. Presently he unstrapped it, glanced at McIntyre, and shook his head.

"No go, doc?"

"That's right, Captain."

Harriman looked from face to face. "My heart's all right — that's just a flutter."

The physician's brows shot up. "Is it? But it's not just your heart; at your age your bones are brittle, too brittle to risk a take-off."

"Sorry, sir," added the pilot, "but the Bates County Fair Association pays the doctor here to see to it that I don't take anyone up who might be hurt by the acceleration."

The old man's shoulders drooped miserably. "I rather expected it."

"Sorry, sir." McIntyre turned to go, but Harriman followed him out.

"Excuse me, Captain —"

"Yes?"

"Could you and your, uh, engineer have dinner with me after your flight?"

The pilot looked at him quizzically. "I don't see why not. Thanks."

"Captain McIntyre, it is difficult for me to see why anyone would quit the Earth-Moon run." Fried chicken and hot biscuits in a private dining room of the best hotel the little town of Butler afforded, three-star Hennessey and Corona-Coronas had produced a friendly atmosphere in which three men could talk freely.

"Well, I didn't like it."

"Aw, don't give him that, Mac — you know damn well it was Rule G that got you." McIntyre's mechanic poured himself another brandy as he spoke.

McIntyre looked sullen. "Well, what if I did take a couple o' drinks? Anyhow, I could have squared that — it was the damn persnickety regulations that got me fed up. Who are you to talk? — Smuggler!"

"Sure I smuggled! Who wouldn't with all those beautiful rocks just aching to be taken back to Earth. I had a diamond once as big as... But if I hadn't been caught I'd be in Luna City tonight. And so would you, you drunken blaster ... with the boys buying us drinks, and the girls smiling and making suggestions..." He put his face down and began to weep quietly.

McIntyre shook him. "He's drunk."

"Never mind." Harriman interposed a hand. "Tell me, are you really satisfied not to be on the run any more?"

McIntyre chewed his lip. "No — he's right of course. This

barnstorming isn't what it's all cracked up to be. We've been hopping junk at every pumpkin doin's up and down the Mississippi valley — sleeping in tourist camps, and eating at grease burners. Half the time the sheriff has an attachment on the ship, the other half the Society for the Prevention of Something or Other gets an injunction to keep us on the ground. It's no sort of a life for a rocket man."

"Would it help any for you to get to the Moon?"

"Well. . . Yes. I couldn't get back on the Earth-Moon run, but if I was in Luna City, I could get a job hopping ore for the Company — they're always short of rocket pilots for that, and they wouldn't mind my record. If I kept my nose clean, they might even put me back on the run, in time."

Harriman fiddled with a spoon, then looked up. "Would you young gentlemen be open to a business proposition?"

"Perhaps. What is it?"

"You own the *Care Free*?"

"Yeah. That is, Charlie and I do — barring a couple of liens against her. What about it?"

"I want to charter her... for you and Charlie to take me to the Moon!"

Charlie sat up with a jerk. "D'joo hear what he said, Mac? He wants us to fly that old heap to the Moon!"

McIntyre shook his head. "Can't do it, Mister Harriman. The old boat's worn out. You couldn't convert to escape fuel. We don't even use standard juice in her — just gasoline and liquid air. Charlie spends all of his time tinkering with her at that. She's going to blow up some day."

"Say, Mister Harriman," put in Charlie, "what's the matter with getting an excursion permit and going in a Company ship?"

"No, son," the old man replied, "I can't do that. You know the conditions under which the U. N. granted the Company a monopoly on lunar exploitation — no one to enter space who was not physically qualified to stand up under it. Company to take full responsibility for the safety and health of all citizens beyond the stratosphere. The official reason for granting the franchise was to avoid unnecessary loss of life during the first few years of space travel."

"And you can't pass the physical exam?" Harriman shook his head.

"Well, what the hell — if you can afford to hire us, why don't you just bribe yourself a brace of Company docs? It's been done before."

Harriman smiled ruefully. "I know it has, Charlie, but it won't work for me. You see, I'm a tad too prominent. My full name is Delos D. Harriman."

"What? You *are* old D.D.? But hell's bells, you own a big slice of the Company yourself — you practically *are* the Company; you ought to be able to do anything you like, rules or no rules."

"That is a not unusual opinion, son, but it is incorrect. Rich men aren't more free than other men; they are less free, a good deal less free. I tried to do what you suggest, but, the other directors would not permit me. They are afraid of losing their franchise. It costs them a good deal in — uh — political contact expenses to retain it, as it is."

"Well, I'll be a— Can you tie that, Mac? A guy with lots of dough, and he can't spend it the way he wants to." McIntyre did not answer, but waited for Harriman to continue.

"Captain McIntyre, if you had a ship, would you take me?"

McIntyre rubbed his chin. "It's against the law."

"I'd make it worth your while."

"Sure he would, Mr. Harriman. Of course you would, Mac. Luna City! Oh, baby!"

"Why do you want to go to the Moon so badly, Mister Harriman?"

"Captain, it's the one thing I've really wanted to do all my life — ever since I was a young boy. I don't know whether I can explain it to you, or not. You young fellows have grown up to rocket travel the way I grew up to aviation. I'm a great deal older than you are, at least fifty years older. When I was a kid practically nobody believed that men would ever reach the Moon. You've seen rockets all your lives, and the first to reach the Moon got there before you were a young boy. When I was a boy they laughed at the idea.

"But I believed — I believed. I read Verne, and Wells, and Smith, and I believed that we could do it — that we would do it. I set my heart on being one of the men to walk the surface of the Moon, to see her other side, and to look back on the face of the Earth, hanging in the sky.

"I used to go without my lunches to pay my dues in the American Rocket Society, because I wanted to believe that I was helping to bring the day nearer when we would reach the Moon. I was already an old man when that day arrived. I've lived longer than I should, but I would not let myself die... I will not! — until I have set foot on the Moon."

McIntyre stood up and put out his hand. "You find a ship, Mister Harriman. I'll drive 'er."

"Atta' boy, Mac! I told you he would, Mister Harriman."

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Harriman mused and dozed during the half-hour run to the north into Kansas City, dozed in the light troubled sleep of old age. Incidents out of a long life ran through his mind in vagrant dreams. There was that time... oh, yes, 1910 ... A little boy on a warm spring night;

"What's that, Daddy?" — "That's Halley's comet, Sonny." — "Where did it come from?" — "I don't know, Son. From way out in the sky somewhere." — "It's *beyoootiful*, Daddy. I want to touch it." — "'Fraid not, Son."

"Delos, do you mean to stand there and tell me you put the money we had saved for the house into that crazy rocket company?" — "Now, Charlotte, please! It's not crazy; it's a sound business investment. Someday soon rockets will fill the sky. Ships and trains will be obsolete. Look what happened to the men that had the foresight to invest in Henry Ford." — "We've been all over this before." — "Charlotte, the day will come when men will rise up off the Earth and visit the Moon, even the planets. This is the beginning." — "Must you shout?" — "I'm sorry, but—" — "I feel a headache coming on. Please try to be a little quiet when you come to bed."

He hadn't gone to bed. He had sat out on the veranda all night long, watching the full Moon move across the sky. There would be the devil to pay in the morning, the devil and a thin-lipped silence. But he'd stick by his guns. He'd given in on most things, but not on this. But the night was his. Tonight he'd be alone with his old friend. He searched her face. Where was Mare Crisium? Funny, he couldn't make it out. He used to be able to see it plainly when he was a boy. Probably needed new glasses — this constant office work wasn't good for his eyes.

But he didn't need to see, he knew where they all were; Crisium, Mare Fecunditatis, Mare Tranquilitatis — that one had a satisfying roll! — the Apennines, the Carpathians, old Tycho with it's mysterious rays.

Two hundred and forty thousand miles — ten times around the Earth. Surely men could bridge a little gap like that. Why, he could almost reach out and touch it, nodding there behind the elm trees. Not that he could help. He hadn't the education.

"Son, I want to have a little serious talk with you." — "Yes,

Mother." — "I know you had hoped to go to college next year—" (Hoped! He had lived for it. The University of Chicago to study under Moulton, then on to the Yerkes Observatory to work under the eye of Dr. Frost himself) — "and I had hoped so too. But with your father gone, and the girls growing up, it's harder to make ends meet. You've been a good boy, and worked hard to help out. I know you'll understand." — "Yes, Mother."

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"Extra! Extra! STRATOSPHERE ROCKET REACHES PARIS. Read aaaaallllll about 't." The the little man in the bifocals snatched at the paper and hurried back to the office. — "Look at this, George." — "Huh? Hmm, interesting, but what of it?" — "Can't you see? The next stage is to the Moon!" — "God, but you're a sucker, Delos. The trouble with you is, you read too many of those trashy magazines. Now I caught my boy reading one of 'em just last week, *Stunning Stories*, or some such title, and dressed him down proper. Your folks should have done you the same favor." — Harriman squared his narrow, middle-aged shoulders. "They will so reach the Moon!" — His partner laughed. "Have it your own way. If baby wants the Moon, papa bring it for him. But you stick to your discounts and commissions; that's where the money is."

The big car droned down the Paseo, and turned off on Armour Boulevard. Old Harriman stirred uneasily in his sleep and muttered to himself.

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"But Mister Harriman—" The young man with the notebook was plainly perturbed. The old man grunted.

"You heard me. Sell 'em. I want every share I own realized in cash as rapidly as possible; Spaceways, Spaceways Provisioning Company, Artemis Mines, Luna City Recreations, the whole lot of them."

"It will depress the market. You won't realize the full value of your holdings."

"Don't you think I know that? I can afford it."

"What about the shares you had earmarked for Richardson Observatory, and for the Harriman Scholarships?"

"Oh, yes. Don't sell those. Set up a trust. Should have done it long ago. Tell young Kamens to draw up the papers. He knows what I want"

The interoffice visor flashed into life. "The gentlemen are here, Mr. Harriman."

"Send 'em in. That's all, Ashley. Get busy." Ashley went out as McIntyre and Charlie entered. Harriman got up and trotted forward to greet them.

"Come in, boys, come in. I'm so glad to see you. Sit down. Sit down. Have a cigar."

"Mighty pleased to see you, Mr. Harriman," acknowledged Charlie. "In fact, you might say we need to see you."

"Some trouble, gentlemen?" Harriman glanced from face to face. McIntyre answered him.

"You still mean that about a job for us, Mr. Harriman?"

"Mean it? Certainly, I do. You're not backing out on me?"

"Not at all. We need that job now. You see the *Care Free* is lying in the middle of the Osage River, with her jet split clear back to the injector."

"Dear me! You weren't hurt?"

"No, aside from sprains and bruises. We jumped."

Charlie chortled. "I caught a catfish with my bare teeth."

In short order they got down to business. "You two will have to buy a ship for me. I can't do it openly; my colleagues would figure out what I mean to do and stop me. I'll supply you with all the cash you need. You go out and locate some sort of a ship that can be refitted for the trip. Work, up some good story about how you are buying it for some playboy as a stratosphere yacht, or that you plan to establish an arctic-antarctic tourist route. Anything as long as no one suspects that she is being-outfitted for space flight.

"Then, after the Department of Transport licenses her for strato flight, you move out to a piece of desert out west — I'll find a likely parcel of land and buy it — and then I'll join you. Then we'll install the escape-fuel tanks, change the injectors, and timers, and so forth, to fit her for the hop. How about it?"

McIntyre looked dubious. "It'll take a lot of doing. Charlie, do you think you can accomplish that changeover without a dockyard and shops?"

"Me? Sure I can — with your thick-fingered help. Just give me the tools and materials I want, and don't hurry me too much. Of course, it won't be fancy—"

"Nobody wants it to be fancy. I just want a ship that won't blow when I start slapping the keys. Isotope fuel is no joke."

"It won't blow, Mac."

"That's what you thought about the *Care Free*."

"That ain't fair, Mac. I ask you, Mr. Harriman — That heap was junk, and we knew it. This'll be different. We're going to spend some dough and do it right. Ain't we, Mr. Harriman?"

Harriman patted him on the shoulder. "Certainly we are, Charlie. You can have all the money you want. That's the least of our worries. Now do the salaries and bonuses I mentioned suit you? I don't want you to be short."

"—as you know, my clients are his nearest relatives and have his interests at heart. We contend that Mr. Harriman's conduct for the past several weeks, as shown by the evidence here adduced, gives clear indication that a mind, once brilliant in the world of finance, has become senile. It is, therefore, with the deepest regret that we pray this honorable court, if it pleases, to declare Mr. Harriman incompetent and to assign a conservator to protect his financial interests and those of his future heirs and assigns." The attorney sat down, pleased with himself.

Mr. Kamens took the floor. "May it please the court, if my esteemed friend is *quite* through, may I suggest that in his last few words be gave away his entire thesis. '—the financial interests of future heirs and assigns.' It is evident that the petitioners believe that my client should conduct his affairs in such a fashion as to insure that his nieces and nephews, and their issue, will be supported in unearned luxury for the rest of their lives. My client's wife has passed on, he has no children. It is admitted that he has provided generously for his sisters and their children in times past, and that he has established annuities for such near kin as are without means of support.

"But now like vultures, worse than vultures, for they are not content to let him die in peace, they would prevent my client from enjoying his wealth in whatever manner best suits him for the few remaining years of his life. It is true that he has sold his holdings; is it strange that an elderly man should wish to retire? It is true that he suffered some paper losses in liquidation. 'The value of a thing is what that thing will bring.' He was retiring and demanded cash. Is there anything strange about that?

"It is admitted that he refused to discuss his actions with his so-loving kinfolk. What law, or principle, requires a man to consult with his nephews on anything?

"Therefore, we pray that this court will confirm my client in his right to do what he likes with his own, deny this petition, and send

these meddlers about their business."

The judge took off his spectacles .and polished them thoughtfully.

"Mr. Kamens, this court has as high a regard for individual liberty as you have, and you may rest assured that any action taken will be solely in the interests of your client. Nevertheless, men do grow old, men do become senile, and in such cases must be protected.

"I shall take this matter under advisement until tomorrow. Court is adjourned."

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From the Kansas City *Star*:

"ECCENTRIC MILLIONAIRE DISAPPEARS"

"—failed to appear for the adjourned hearing. The bailiffs returned from a search of places usually frequented by Harriman with the report that he had not been seen since the previous day. A bench warrant under contempt proceedings has been issued and—"

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A desert sunset is a better stimulant for the appetite than a hot dance orchestra. Charlie testified to this by polishing the last of the ham gravy with a piece of bread. Harriman handed each of the younger men cigars and took one himself.

"My doctor claims that these weeds are bad for my heart condition," he remarked as he lighted it, "but I've felt so much better since I joined you boys here on the ranch that I am inclined to doubt him." He exhaled a cloud of blue-grey smoke and resumed. "I don't think a man's health depends so much on what he does as on whether he wants to do it. I'm doing what I want to do."

"That's all a man can ask of life," agreed McIntyre.

"How does the work look now, boys?"

"My end's in pretty good shape," Charlie answered. "We finished the second pressure tests on the new tanks and the fuel lines today. The ground tests are all done, except the calibration runs. Those won't take long — just the four hours to make the runs if I don't run into some bugs. How about you, Mac?"

McIntyre ticked them off on his fingers. "Food supplies and water on board. Three vacuum suits, a spare, and service kits. Medical supplies. The buggy already had all the standard equipment for strato flight. The late lunar ephemerides haven't arrived as yet."

"When do you expect them?"

"Any time — they should be here now. Not that it matters. This guff about how hard it is to navigate from here to the Moon is hokum to impress the public. After all you can see your destination — it's not like ocean navigation. Gimme a sextant and a good radar and I'll set you down any place on the Moon you like, without cracking an almanac or a star table, just from a general knowledge of the relative speeds involved."

"Never mind the personal buildup, Columbus," Charlie told him, "we'll admit you can hit the floor with your hat. The general idea is, you're ready to go now. Is that right?"

"That's it."

"That being the case, I could run those tests tonight. I'm getting jumpy — things have been going too smoothly. If you'll give me a hand, we ought to be in bed by midnight."

"O.K., when I finish this cigar."

They smoked in silence for a while, each thinking about the coming trip and what it meant to him. Old Harriman tried to repress the excitement that possessed him at the prospect of immediate realization of his life-long dream.

"Mr. Harriman—"

"Eh? What is it, Charlie?"

"How does a guy go about getting rich, like you did?"

"Getting rich? I can't say; I never tried to get rich. I never wanted to be rich, or well known, or anything like that."

"Huh?"

"No, I just wanted to live a long time and see it all happen. I wasn't unusual; there were lots of boys like me — radio hams, they were, and telescope builders, and airplane amateurs. We had science clubs, and basement laboratories, and science-fiction leagues — the kind of boys who thought there was more romance in one issue of the *Electrical Experimenter* than in all the books Dumas ever wrote. We didn't want to be one of Horatio Alger's Get-Rich heroes either, we wanted to build space ships. Well, some of us did."

"Jeez, Pop, you make it sound exciting."

"It was exciting, Charlie. This has been a wonderful, romantic century, for all of its bad points. And it's grown more wonderful and more exciting every year. No, I didn't want to be rich; I just wanted to live long enough to see men rise up to the stars, and, if God was good to me, to go as far as the Moon myself." He carefully deposited an inch

of white ash in a saucer. "It has been a good life. I haven't any complaints."

-

McIntyre pushed back his chair. "Come on, Charlie, if you're ready."

They all got up. Harriman started to speak, then grabbed at his chest, his face a dead grey-white.

"Catch him, Mac!"

"Where's his medicine?"

"In his vest pocket."

They eased him over to a couch, broke a small glass capsule in a handkerchisf, and held it under his nose. The volatile released by the capsule seemed to bring a little color into his face. They did what little they could for him, then waited for him to regain consciousness.

Charlie broke the uneasy silence. "Mac, we ain't going through with this."

"Why not?"

"It's murder. He'll never stand up under the initial acceleration."

"Maybe not, but it's what he wants to do. You heard him."

"But we oughtn't to let him."

"Why not? It's neither your business, nor the business of this damn paternalistic government, to tell a man not to risk his life doing what he really wants to do."

"All the same, I don't feel right about it. He's such a swell old duck."

"Then what d'yuh want to do with him — send him back to Kansas City so those old harpies can shut him up in a laughing academy till he dies of a broken heart?"

"N-no-o-o — not that."

"Get out there, and make your set-up for those test runs. I'll be along."

A wide-tired desert runabout rolled in the ranch yard gate the next morning and stopped in front of the house. A heavy-set man with a firm, but kindly, face climbed out and spoke to McIntyre, who approached to meet him.

"You James Mcintyre?"

"What about it?"

"I'm the deputy federal marshal hereabouts. I got a warrant for your arrest."

"What's the charge?"

"Conspiracy to violate the Space Precautionary Act."

Charlie joined the pair. "What's up, Mac?"

The deputy answered. "You'd be Charles Cummings, I guess. Warrant here for you. Got one for a man named Harriman, too, and a court order to put seals on your space ship."

"We've no space ship."

"What d'yuh keep in that big shed?"

"Strato yacht."

"So? Well, I'll put seals on her until a space ship comes along. Where's Harriman?"

"Right in there." Charlie obliged by pointing, ignoring McIntyre's scowl.

The deputy turned his head. Charlie couldn't have missed the button by a fraction of an inch for the deputy collapsed quietly to the ground. Charlie stood over him, rubbing his knuckles and mourning.

"Damn it to hell — that's the finger I broke playing shortstop. I'm always hurting that finger."

"Get Pop into the cabin," Mac cut him short, "and strap him into his hammock."

"Aye aye, Skipper."

-

They dragged the ship by tractor out of the hangar, turned, and went out the desert plain to find elbow room for the take-off. They climbed in. McIntyre saw the deputy from his starboard conning port. He was staring disconsolately after them.

Mcintyre fastened his safety belt, settled his corset, and spoke into the engineroom speaking tube. "All set, Charlie?"

"All set, Skipper. But you can't raise ship yet, Mac — *She ain't named!"*

"No time for your superstitions!"

Harriman's thin voice reached them. "Call her the *Lunatic* — It's the only appropriate name!"

McIntyre settled his head into the pads, punched two keys, then three more in rapid succession, and the *Lunatic* raised ground.

"How are you, Pop?" Charlie searched the old man's face anxiously. Harriman licked his lips and managed to speak.

"Doing fine, son. Couldn't be better."

"The acceleration is over; it won't be so bad from here on. I'll unstrap you so you can wiggle around a little. But I think you'd better stay in the hammock." He tugged at buckles. Harriman partially repressed a groan.

"What is it, Pop?"

"Nothing. Nothing at all. Just go easy on that side."

Charlie ran his fingers over the old man's side with the sure, delicate touch of a mechanic. "You ain't foolin' me none, Pop. But there isn't much I can do until we ground."

"Charlie—"

"Yes, Pop?"

"Can't I move to a port? I want to watch the Earth."

"Ain't nothin' to see yet; the ship hides it. As soon as we turn ship, I'll move you. Tell you what; I'll give you a sleepy pill, and then wake you when we do."

"No!"

"Huh?"

"I'll stay awake."

"Just as you say, Pop."

Charlie clambered monkey fashion to the nose of the ship, and anchored to the gymbals of the pilot's chair. McIntyre questioned him with his eyes.

"Yeah, he's alive all right," Charlie told him, "but he's in bad shape."

"How bad?"

"Couple of cracked ribs anyhow. I don't know what else. I don't know whether he'll last out the trip,

Mac. His heart was pounding something awful."

"He'll last, Charlie. He's tough."

"Tough? He's delicate as a canary."

"I don't mean that. He's tough way down inside where it counts."

"Just the same you'd better set her down awful easy if you want to ground with a full complement aboard."

"I will. I'll make one full swing around the Moon and ease her in on an involute approach curve. We've got enough fuel, I think."

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They were now in a free orbit; after McIntyre turned ship, Charlie went back, unslung the hammock, and moved Harriman, hammock and all, to a side port. Mcliityre steadied the ship about a transverse axis so that the tail pointed toward the sun, then gave a short blast on two tangential jets opposed in couple to cause the ship to spin slowly about her longitudinal axis, and thereby create a slight artificial gravity. The initial weightlessness when coasting commenced had knotted the old man with the characteristic nausea of free flight, and the pilot wished to save his passenger as much discomfort as possible.

But Harriman was not concerned with the condition of his stomach. There it was, all as he had imagined it so many times.

The Moon swung majestically past the view port, wider than he had ever seen it before, all of her familiar features cameo clear. She gave way to the Earth as the ship continued its slow swing, the Earth itself as he had envisioned her, appearing like a noble moon, many times as wide as the Moon appears to the Earthbound, and more luscious, more sensuously beautiful than the silver Moon could be. It was sunset near the Atlantic seaboard — the line of shadow cut down the coast line of North America, slashed through Cuba, and obscured all but the west coast of South America. He savored the mellow blue of the Pacific Ocean, felt the texture of the soft green and brown of the continents, admired the blue-white cold of the polar caps. Canada and the northern states were obscured by cloud, a vast low pressure area that spread across the continent. It shone with an even more satisfactory dazzling white than the polar caps.

As the ship swung slowly, around, Earth would pass from view, and the stars would march across the port the same stars he had always known, but steady, brighter, and unwinking against a screen of perfect, live black. Then the Moon would swim into view again to claim his thoughts.

He was serenely happy in a fashion not given to most men, even in a long lifetime. He felt as if he were every man who has ever lived, looked up at the stars, and longed.

As the long hours came and went he watched and dozed and dreamed. At least once he must have fallen into deep sleep, or possibly delirium, for he came to with a start, thinking that his wife,

Charlotte, was calling to him. "Delos!" the voice had said. "Delos! Come in from there! You'll catch your death of cold in that night air."

Poor Charlotte! She had been a good wife to him, a good wife. He was quite sure that her only regret in dying had been her fear that he could not take proper care of himself. It had not been her fault that she had not shared his dream, and his need.

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Charlie rigged the hammock in such a fashion that Harriman could watch from the starboard port when they swung around the far face of the Moon. He picked out the landmarks made familiar to him by a thousand photographs with nostalgic pleasure, as if he were returning to his own country. Mcintyre brought her slowly down as they came back around to the Earthward face, and prepared to land east of Mare Fecunditatis, about ten miles from Luna City.

It was not a bad landing, all things considered. He had to land without coaching from the ground, and he had no second pilot to watch the radar for him. In his anxiety to make it gentle he missed his destination by some thirty miles, but he did his cold-sober best. But at that it was bumpy. As they grounded and the pumice dust settled around them, Charlie came up to the control station.

"How's our passenger?" Mac demanded.

"I'll see, but I wouldn't make any bets. That landing stunk, Mac."

"Damn it, I did my best."

"I know you did, Skipper. Forget it."

But the passenger was alive and conscious although bleeding from the nose and with a pink foam on his lips. He was feebly trying to get himself out of his cocoon. They helped him, working together.

"Where are the vacuum suits?" was his first remark.

"Steady, Mr. Harriman. You can't go out there yet. We've got to give you some first aid."

"*Get me that suit!* First aid can wait."

Silently they did as he ordered. His left leg was practically useless, and they had to help him through the lock, one on each side. But with his inconsiderable mass having a lunar weight of only twenty pounds, he was no burden.. They found a place some fifty yards from the ship where they could prop him up and let him look, a chunk of scoria supporting his head.

Mcintyre put his helmet against the old man's and spoke. "We'll

leave you here to enjoy the view while we get ready for the trek into town. It's a forty-miler, pretty near, and we'll have to break out spare air bottles and rations and stuff. We'll be back soon."

Harriman nodded without answering, and squeezed their gauntlets with a grip that was surprisingly strong.

He sat very quietly, rubbing his hands against the soil of the Moon and sensing the curiously light pressure of his body against the ground. At long last there was peace in his heart. His hurts had ceased to pain him. He was where he had longed to be — he had followed his need.

Over the western horizon hung the Earth at last quarter, a green-blue giant moon. Overhead the Sun shone down from a black and starry sky. And underneath the Moon, the soil of the Moon itself. He was on the Moon!

He lay back still while a bath of content flowed over him like a tide at flood, and soaked to his very marrow.

His attention strayed momentarily, and he thought once again that his name was called. Silly, he thought, I'm getting old — my mind wanders.

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Back in the cabin Charlie and Mac were rigging shoulder yokes on a stretcher. "There. That will do," Mac commented. "We'd better stir Pop out; we ought to be going."

"I'll get him," Charlie replied. "I'll just pick him up and carry him. He don't weigh nothing."

Charlie was gone longer than Mcintyre had expected him to be. He returned alone. Mac waited for him to close the lock, and swing back his helmet. "Trouble?"

"Never mind the stretcher, Skipper. We won't be needin' it.

"Yeah, I mean it," he continued. "Pop's done for. I did what was necessary."

Mcintyre bent down without a word and picked up the wide skis necessary to negotiate the powdery ash. Charlie followed his example. Then they swung the spare air bottles over their shoulders, and passed out through the lock.

They didn't bother to close the outer door of the lock behind them.

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# Tenderfoot in Space

*When this book was in process. Dr. Kondo asked me whether there were any stories of Robert's which had not been reprinted. On looking over the list of stories, I found that "Tenderfoot in Space" had never printed in anything except when it originally appeared in* Boys' Life. *All copies in our possession had been sent to the UCSC Archives, so I asked them to Xerox those and send them to me, and found this introduction by Robert, which he had added to the carbon in the library before he sent it down there. I was completely surprised, and asked Dr. Kondo whether he would like to use it.*

*Here it is* — Virginia Heinlein

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*This was written a year before Sputnik and is laid on the Venus earthbound astronomers inferred before space probes. Two hours of rewriting—a word here, a word there—could change it to a planet around some other star. But to what purpose? Would* The Tempest *be improved if Bohemia had a sea coast? If I ever publish that collection of Boy Scout stories, this story will appear unchanged.*

*Nixie is (of course) my own dog. But in 1919, when I was 12 and a Scout, he had to leave me—a streetcar hit him.*

*If this universe has any reasonable teleology whatever (a point on which I am unsure) then there is some provision for the Nixies in it.*

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## Chapter One

"Heel, Nixie," the boy said softly, "and keep quiet."

The little mongrel took position left and rear of his boy, waited. He could feel that Charlie was upset and he wanted to know why — but an order from Charlie could not be questioned.

The boy tried to see whether or not the policeman was. noticing them. He felt light-headed — neither he nor his dog had eaten that day. They had stopped in front of this supermarket, not to buy for the boy had no money left, but because of a "BOY WANTED" sign in the window.

It was then that he had noticed the reflection of the policeman in the glass.

The boy hesitated, trying to collect his cloudy thoughts. Should he go inside and ask for the job? Or should he saunter past the policeman? Pretend to be just out for a walk?

The boy decided to go on, get out of sight. He signaled the dog to stay close and turned away from the window. Nixie came along, tail high. He did not care where they went as long as he was with Charlie. Charlie had belonged to him as far back as he could remember; he could imagine no other condition. In fact Nixie would not have lived past his tenth day had not Charlie fallen in love with him; Nixie had been the least attractive of an unfortunate litter; his mother was Champion Lady Diana of Ojai — his father was unknown.

But Nixie was not aware that a neighbor boy had begged his life from his first owners. His philosophy was simple: enough to eat, enough sleep, and the rest of his time spent playing with Charlie. This present outing had been Charlie's idea, but any outing was welcome. The shortage of food was a nuisance but Nixie automatically forgave Charlie such errors — after all, boys will be boys and a wise dog accepted the fact. The only thing that troubled him was that Charlie did not have the happy heart which was a proper part of all hikes.

As they moved past the man in the blue uniform, Nixie felt the man's interest in them, sniffed his odor, but could find no real unfriendliness in it. But Charlie was nervous, alert, so Nixie kept his own attention high.

The man in uniform said, "Just a moment, son —"

Charlie stopped, Nixie stopped. "You speaking to me, officer?"

"Yes. What's your dog's name?"

Nixie felt Charlie's sudden terror, got ready to attack. He had never yet had to bite anyone for his boy — but he was instantly ready. The hair between his shoulder blades stood up.

Charlie answered, "Uh ... his name is 'Spot."

"So?" The stranger said sharply, "Nixie!"

Nixie had been keeping his eyes elsewhere, in order not to distract his ears, his nose, and the inner sense with which he touched people's feelings. But he was so startled at hearing this stranger call him by name that he turned his head and looked at him.

"His name is 'Spot,' is it?" the policeman said quietly. "And mine is Santa Claus. But you're Charlie Vaughn and you're going home." He spoke into his helmet phone: "Nelson, reporting a pickup on that Vaughn missing-persons flier. Send a car. I'm in front of the new supermarket."

Nixie had trouble sorting out Charlie's feelings; they were both sad and glad. The stranger's feelings were slightly happy but mostly nothing; Nixie decided to wait and see. He enjoyed the ride in the police car, as he always enjoyed rides, but Charlie did not, which spoiled it a little.

They were taken to the local Justice of the Peace. "You're Charles Vaughn?"

Nixie's boy felt unhappy and said nothing.

"Speak up, son," insisted the old man. "If you aren't, then you must have stolen that dog." He read from a paper " — accompanied by a small brown mongrel, male, well trained, responds to the name 'Nixie.' Well?"

Nixie's boy answered faintly, "I'm Charlie Vaughn."

"That's better. You'll stay here until your parents pick you up." The judge frowned. "I can't understand your running away. Your folks are emigrating to Venus, aren't they?"

"Yes, sir."

"You're the first boy I ever met who didn't want to make the Big Jump." He pointed to a pin on the boy's lapel. "And I thought Scouts were trustworthy. Not to mention obedient. What got into you, son? Are you scared of the Big Jump? 'A Scout is Brave.' That doesn't mean you don't have to be scared — everybody is at times. 'Brave' simply means you don't run even if you are scared."

"I'm not scared," Charlie said stubbornly. "I want to go to Venus."

"Then why run away when your family is about to leave?"

Nixie felt such a burst of warm happy-sadness from Charlie that he licked his hand. "Because Nixie can't go!"

"Oh." The judge looked at boy and dog. "I'm sorry, son. That problem is beyond my jurisdiction." He drummed his desk top. "Charlie ... will you promise, Scout's honor, not to run away again until your parents show up?"

"Uh ... yes, sir."

"Okay. Joe, take them to my place. Tell my wife she had better see how recently they've had anything to eat."

-

The trip home was long. Nixie enjoyed it, even though Charlie's father was happy-angry and his mother was happy-sad and Charlie himself was happy-sad-worried. When Nixie was home he checked

quickly through each room, making sure that all was in order and that there were no new smells. Then he returned to Charlie.

The feelings had changed. Mr. Vaughn was angry, Mrs. Vaughn was sad, Charlie himself gave out such bitter stubbornness that Nixie went to him, jumped onto his lap, and tried to lick his face. Charlie settled Nixie beside him, started digging fingers into the loose skin back of Nixie's neck. Nixie quieted at once, satisfied that he and his boy could face together whatever it was — but it distressed him that the other two were not happy. Charlie belonged to him; they belonged to Charlie; things were better when they were happy, too.

Mr. Vaughn said, "Go to bed, young man, and sleep on it. I'll speak with you again tomorrow."

"Yes, sir. Good night, sir."

"Kiss your mother goodnight. One thing more — Do I need to lock doors to be sure you will be here in the morning?"

"No, sir."

Nixie got on the foot of the bed as usual, tromped out a space, laid his tail over his nose, and started to go to sleep. But his boy was not sleeping; his sadness was taking the distressing form of heaves and sobs. So Nixie got up, went to the other end of the bed and licked away tears — then let himself be pulled into Charlie's arms and tears applied directly to his neck. It was not comfortable and too hot, besides being taboo. But it was worth enduring as Charlie started to quiet down, presently went to sleep.

Nixie waited, gave him a lick on the face to check his sleeping, then moved to his end of the bed.

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Mrs. Vaughn said to Mr. Vaughn, "Charles, isn't there anything we can do for the boy?"

"Confound it, Nora. We're getting to Venus with too little money as it is. If anything goes wrong, we'll be dependent on charity."

"But we do have a little spare cash."

"Too little. Do you think I haven't considered it? Why, the fare for that worthless dog would be almost as much as it is for Charlie himself! Out of the question! So why nag me? Do you think I enjoy this decision?"

"No, dear." Mrs. Vaughn pondered. "How much does Nixie weigh? I ... well, I think I could reduce ten more pounds if I really tried."

"What? Do you want to arrive on Venus a living skeleton? You've reduced all the doctor advises, and so have I."

"Well ... I thought that if somehow, among us, we could squeeze out Nixie's weight — it's not as if he were a St. Bernard! — we could swap it against what we weighed for our tickets."

Mr. Vaughn shook his head unhappily. "They don't do it that way."

"You told me yourself that weight was everything. You even got rid of your chess set."

"We could afford thirty pounds of chess sets, or china, or cheese, where we can't afford thirty pounds of dog."

"I don't see why not."

"Let me explain. Surely, it's weight; it's always weight in a space ship. But it isn't just my hundred and sixty pounds, or your hundred and twenty, not Charlie's hundred and ten. We're not dead weight; we have to eat and drink and breathe air and have room to move — that last takes more weight because it takes more ship weight to hold a live person than it does for an equal weight in the cargo hold. For a human being there is a complicated formula — hull weight equal to twice the passenger's weight, plus the number of days in space times four pounds. It takes a hundred and forty-six days to get to Venus — so it means that the calculated weight for each of us amounts to six hundred and sixteen pounds before they even figure in our actual weights. But for a dog the rate is even higher — five pounds per day instead of four."

"That seems unfair. Surely a little dog can't eat as much as a man? Why, Nixie's food costs hardly anything."

Her husband snorted. "Nixie eats his own rations and half of what goes on Charlie's plate. However, it's not only the fact that a dog does eat more for his weight, but also they don't reprocess waste with a dog, not even for hydroponics."

"Why not? Oh, I know what you mean. But it seems silly."

"The passengers wouldn't like it. Never mind; the rule is: five pounds per day for dogs. Do you know what that makes Nixie's fare? Over three thousand dollars!"

"My goodness!"

"My ticket comes to thirty-eight hundred dollars and some, you get by for thirty-four hundred, and Charlie's fare is thirty-three hundred — yet that confounded mongrel dog, which we couldn't sell for his veterinary bills, would cost three thousand dollars. If we had that to

spare — which we haven't — the humane thing would be to adopt some orphan, spend the money on him, and thereby give him a chance on an uncrowded planet... not waste it on a dog. Confound it! — a year from now Charlie will have forgotten this dog."

"I wonder."

"He will. When I was a kid, I had to give up dogs — more than once they died, or something. I got over it. Charlie has to make up his mind whether to give Nixie away ... or have him put to sleep." He chewed his lip. "We'll get him a pup on Venus."

"It won't be Nixie."

"He can name it Nixie. He'll love it as much."

"But — Charles, how is it there are dogs on Venus if it's so dreadfully expensive to get them there?"

"Eh? I think the first exploring parties used them to scout. In any case they're always shipping animals to Venus; our own ship is taking a load of milch cows."

"That must be terribly expensive."

"Yes and no. They ship them in sleep-freeze of course, and a lot of them never revive. But they cut their losses by butchering the dead ones and selling the meat at fancy prices to the colonists. Then the ones that live have calves and eventually it pays off." He stood up. "Nora, let's go to bed. It's sad — but our boy is going to have to make a man's decision. Give the mutt away, or have him put to sleep."

"Yes, dear." She sighed. "I'm coming."

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Nixie was in his usual place at breakfast — lying beside Charlie's chair, accepting tidbits without calling attention to himself. He had learned long ago the rules of the dining room: no barking, no whining, no begging for food, no paws on laps, else the pets of his pet would make difficulties. Nixie was satisfied. He had learned as a puppy to take the world as it was, cheerful over its good points, patient with its minor shortcomings. Shoes were not to be chewed, people were not to be jumped on, most strangers must be allowed to approach the house (subject, of course, to strict scrutiny and constant alertness) — a few simple rules and everyone was happy. Live and let live.

He was aware that his boy was not happy even this beautiful morning. But he had explored this feeling carefully, touching his boy's mind with gentle care by means of his canine sense for feelings, and had decided, from his superior maturity, that the mood would wear

off. Boys were sometimes sad and a wise dog was resigned to it.

Mr. Vaughn finished his coffee, put his napkin aside. "Well, young man?"

Charlie did not answer. Nixie felt the sadness in Charlie change suddenly to a feeling more aggressive and much stronger but no better. He pricked up his ears and waited.

"Chuck," his father said, "last night I gave you a choice. Have you made up your mind?"

"Yes, Dad." Charlie's voice was very low.

"Eh? Then tell me."

Charlie looked at the tablecloth. "You and Mother go to Venus. Nixie and I are staying here."

Nixie could feel anger welling up in the man ... felt him control it. "You're figuring on running away again?"

"No, sir," Charlie answered stubbornly. "You can sign me over to the state school."

*"Charlie!"* It was Charlie's mother who spoke. Nixie tried to sort out the rush of emotions impinging on him.

"Yes," his father said at last, "I could use your passage money to pay the state for your first three years or so, and agree to pay your support until you are eighteen. But I shan't."

"Huh? Why not, Dad?"

"Because, old-fashioned as it sounds, I am head of this family. I am responsible for it — and not just food, shelter, and clothing, but its total welfare. Until you are old enough to take care of yourself I mean to keep an eye on you. One of the prerogatives which go with my responsibility is deciding where the family shall live. I have a better job offered me on Venus than I could ever hope for here, so I'm going to Venus — and my family goes with me." He drummed on the table, hesitated. "I think your chances are better on a pioneer planet, too — but, when you are of age, if you think otherwise, I'll pay your fare back to Earth. But you go with us. Understand?"

Charlie nodded, his face glum.

"Very well. I'm amazed that you apparently care more for that dog than you do for your mother — and myself. But —"

"It isn't that, Dad. Nixie needs —"

"Quiet. I don't suppose you realize it, but I tried to figure this out — I'm not taking your dog away from you out of meanness. If I could

afford it, I'd buy the hound a ticket. But something your mother said last night brought up a third possibility."

Charlie looked up suddenly, and so did Nixie; wondering why the surge of hope in his boy.

"I can't buy Nixie a ticket ... but it's possible to ship him as freight."

"Huh? Why, sure, Dad! Oh, I know he'd have to be caged up — but I'd go down and feed him every day and pet him and tell him it was all right and —"

"Slow down! I don't mean that. All I can afford is to have him shipped the way animals are always shipped in space ships ... in sleep-freeze."

Charlie's mouth hung open. He managed to say, "But that's —"

"That's dangerous. As near as I remember, it's about fifty-fifty whether he wakes up at the other end. But if you want to risk it — well, perhaps it's better than giving him away to strangers, and I'm sure you would prefer it to taking him down to the vet's and having him put to sleep."

Charlie did not answer. Nixie felt such a storm of conflicting emotions in Charlie that the dog violated dining room rules; he raised up and licked the boy's hand.

Charlie grabbed the dog's ear. "All right, Dad," he said gruffly. "We'll risk it — if that's the only way Nixie and I can still be partners."

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Nixie did not enjoy the last few days before leaving; they held too many changes. Any proper dog likes excitement, but home is for peace and quiet. Things should be orderly there — food and water always in the same place, newspapers to fetch at certain hours, milkmen to supervise at regular times, furniture all in its proper place. But during that week all was change — nothing on time, nothing in order. Strange men came into the house (always a matter for suspicion), and he, Nixie, was not even allowed to protest, much less give them the what-for they had coming.

He was assured by Charlie and Mrs. Vaughn that it was "all right" and he had to accept it, even though it obviously was not all right. His knowledge of English was accurate for a few dozen words but there was no way to explain to him that almost everything owned by the Vaughn family was being sold, or thrown away ... nor would it have reassured him. Some things in life were permanent; he had never doubted that the Vaughn home was first among these certainties

By the night before they left, the rooms were bare except for beds. Nixie trotted around the house, sniffing places where familiar objects had been, asking his nose to tell him that his eyes deceived him, whining at the results. Even more upsetting than physical change was emotional change, a heady and not entirely happy excitement which he could feel in all three of his people.

There was a better time that evening, as Nixie was allowed to go to Scout meeting. Nixie always went on hikes and had formerly attended all meetings. But he now attended only outdoor meetings since an incident the previous winter — Nixie felt that too much fuss had been made about it ... just some spilled cocoa and a few broken cups and anyhow it had been that cat's fault.

But this meeting he was allowed to attend because it was Charlie's last Scout meeting on Earth. Nixie was not aware of that but he greatly enjoyed the privilege, especially as the meeting was followed by a party at which Nixie became comfortably stuffed with hot dogs and pop. Scoutmaster McIntosh presented Charlie with a letter of withdrawal, certifying his status and merit badges and asking his admission into any troop on Venus. Nixie joined happily in the applause, trying to outbark the clapping.

Then the Scoutmaster said, 'Okay, Rip."

Rip was senior patrol leader. He got up and said, "Quiet, fellows. Hold it, you crazy savages! Charlie, I don't have to tell you that we're all sorry to see you go ... but we hope you have a swell time on Venus and now and then send a postcard to Troop Twenty-Eight and tell us about it — we'll post 'em on the bulletin board. Anyhow, we wanted to get you a going-away present. But Mr. McIntosh pointed out that you were on a very strict weight allowance and practically anything would either cost you more to take with you than we had paid for it, or maybe you couldn't take it at all, which wouldn't be much of a present.

"But it finally occurred to us that we could do one thing. Nixie —"

Nixie's ears pricked. Charlie said softly, "Steady, boy."

"Nixie has been with us almost as long as you have. He's been around, poking his cold nose into things, longer than any of the tenderfeet, and longer even than some of the second class. So we decided he ought to have his own letter of withdrawal, so that the troop you join on Venus will know that Nixie is a Scout in good standing. Give it to him, Kenny."

The scribe passed over the letter. It was phrased like Charlie's letter, save that it named "Nixie Vaughn, Tenderfoot Scout" and

diplomatically omitted the subject of merit badges. It was signed by the scribe, the scoutmaster, and the patrol leaders and countersigned by every member of the troop. Charlie showed it to Nixie, who sniffed it. Everybody applauded, so Nixie joined happily in applauding himself.

"One more thing," added Rip. "Now that Nixie is officially a Scout, he has to have his badge. So send him front and center."

Charlie did so. They had worked their way through the Dog Care merit badge together while Nixie was a pup, all feet and floppy ears; it had made Nixie a much more acceptable member of the Vaughn family. But the rudimentary dog training required for the merit badge had stirred Charlie's interest; they had gone on to Dog Obedience School together and Nixie had progressed from easy spoken commands to more difficult silent hand signals.

Charlie used them now. At his signal Nixie trotted forward, sat stiffly at attention, front paws neatly drooped in front of his chest, while Rip fastened the tenderfoot badge to his collar, then Nixie raised his right paw in salute and gave one short bark, all to hand signals.

The applause was loud and Nixie trembled with eagerness to join it. But Charlie signaled "hold & quiet," so Nixie remained silently poised in salute until the clapping died away. He returned to heel just as silently, though quivering with excitement. The purpose of the ceremony may not have been clear to him — if so, he was not the first tenderfoot Scout to be a little confused. But it was perfectly clear that he was the center of attention and was being approved of by his friends; it was a high point in his life.

But all in all there had been too much excitement for a dog in one week; the trip to White Sands, shut up in a travel case and away from Charlie, was the last straw. When Charlie came to claim him at the baggage room of White Sands Airport, his relief was so great that he had a puppyish accident, and was bitterly ashamed.

He quieted down on the drive from airport to spaceport, then was disquieted again when he was taken into a room which reminded him of his unpleasant trips to the veterinary — the smells, the white-coated figure, the bare table where a dog had to hold still and be hurt. He stopped dead.

"Come, Nixie!" Charlie said firmly. "None of that, boy. Up!"

Nixie gave a little sigh, advanced and jumped onto the examination table, stood docile but trembling.

"Have him lie down," the man in the white smock said. "I've got to

get the needle into the large vein in his foreleg."

Nixie did so on Charlie's command, then lay tremblingly quiet while his left foreleg was shaved in a patch and sterilized. Charlie put a hand on Nixie's shoulder blades and soothed him while the veterinary surgeon probed for the vein. Nixie bared his teeth once but did not growl, even though the fear in the boy's mind was beating on him, making him just as afraid.

Suddenly the drug reached his brain and he slumped limp.

Charlie's fear surged to a peak but Nixie did not feel it. Nixie's tough little spirit had gone somewhere else, out of touch with his friend, out of space and time — wherever it is that the "I" within a man or a dog goes when the body wrapping it is unconscious.

Charlie said shrilly, "Is he all right?"

"Eh? Of course."

"Uh ... I thought he had died."

"Want to listen to his heart beat?"

"Uh, no — if you say he's all right. Then he's going to be okay? He'll live through it?"

The doctor glanced at Charlie's father, back at the boy, let his eyes rest on Charlie's lapel. "Star Scout, eh?"

"Uh, yes, sir."

"Going on to Eagle?"

"Well ... I'm going to try, sir."

"Good. Look, son. If I put your dog over on that shelf, in a couple of hours he'll be sleeping normally and by tomorrow he won't even know he was out. But if I take him back to the chill room and start him on the cycle —" He shrugged. "Well, I've put eighty head of cattle under today. If forty percent are revived, it's a good shipment. I do my best."

Charlie looked grey. The surgeon looked at Mr. Vaughn, back at the boy. "Son, I know a man who's looking for a dog for his kids. Say the word and you won't have to worry about whether this pooch's system will recover from a shock it was never intended to take."

Mr. Vaughn said, "Well, son?"

Charlie stood mute, in an agony of indecision. At last Mr. Vaughn said-sharply, "Chuck, we've got just twenty minutes before we must check in with Emigration. Well? What's your answer?"

Charlie did not seem to hear. Timidly. he put out one hand, barely touched the still form with the staring, unseeing eyes. Then he snatched his hand back and squeaked, "No! We're going to Venus — both of us!" — turned and ran out of the room.

The veterinary spread his hands helplessly. "I tried."

"I know you did, Doctor," Mr. Vaughn answered gravely. "Thank you."

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The Vaughns took the usual emigrant routing: winged shuttle rocket to the inner satellite station, ugly wingless ferry rocket to the outer station, transshipment there to the great globular cargo liner *Hesperus*. The jumps and changes took two days; they stayed in the deepspace ship for twenty-one tedious weeks, falling in half-elliptical orbit from Earth down to Venus. The time was fixed, an inescapable consequence of the law of gravity and the sizes and shapes of the two planetary orbits.

At first Charlie was terribly excited. The terrific high gravity boost to break away from Earth's mighty grasp was as much of a shocker as he had hoped; six gravities is shocking, even to those used to it. When the shuttle rocket went into free fall a few minutes later, utter weightlessness was as distressing, confusing — and exciting — as he had hoped. It was so upsetting that he would have lost his lunch had he not been injected with anti-nausea drug.

Earth, seen from space, looked as it had looked in color-stereo pictures, but he found that the real thing is as vastly more satisfying as a hamburger is better than a picture of one. In the outer satellite station, someone pointed out to him the famous Captain Nordhoff, just back from Pluto. Charlie recognized those stern, lined features, familiar from TV and news pictures, and realized with odd surprise that the hero was a man, like everyone else. He decided to be a spaceman and famous explorer himself.

S. S. *Hesperus* was a disappointment. It "blasted" away from the outer station with a gentle shove, one tenth gravity, instead of the soul-satisfying, bone-grinding, ear-shattering blast with which the shuttle had left Earth. Also, despite its enormous size, it was terribly crowded. After the Captain had his ship in orbit to intercept Venus five months later, he placed spin on his ship to give his passengers artificial weight — which took from Charlie the pleasant new feeling of weightlessness which he had come to enjoy.

He was bored silly in five days — and there were five months of it ahead. He shared a cramped room with his father and mother and

slept in a hammock swung "nightly" (the ship used Greenwich time) between their bunks. Hammock in place, there was no room in the cubicle; even with it stowed, only one person could dress at a time. The only recreation space was the messrooms and they were always crowded. There was one view port in his part of the ship. At first it was popular, but after a few days even the kids didn't bother, for the view was always the same: stars, and more stars.

By order of the Captain, passengers could sign up for a "sightseeing tour." Charlie's chance came when they were two weeks out — a climb through accessible parts of the ship, a quick look into the power room, a longer look at the hydroponics gardens which provided fresh air and part of their food, and a ten-second glimpse through the door of the Holy of Holies, the control room, all accompanied by a lecture from a bored junior officer. It was over in two hours and Charlie was again limited to his own, very crowded part of the ship.

Up forward there were privileged passengers, who had staterooms as roomy as those of the officers and who enjoyed the luxury of the officers' lounge. Charlie did not find out that they were aboard for almost a month, but when he did, he was righteously indignant.

His father set him straight. "They paid for it."

"Huh? But we paid, too. Why should they get —"

"They paid for luxury. Those first-class passengers each paid about three times what your ticket cost, or mine. We got the emigrant rate — transportation and food and a place to sleep."

"I don't think it's fair."

Mr. Vaughn shrugged. "Why should we have something we haven't paid for?"

"Uh, ... well, Dad, why should they be able to pay for luxuries we can't afford?"

"A good question. Philosophers ever since Aristotle have struggled with that one. Maybe you'll tell me, someday."

"Huh? What do you mean, Dad?"

"Don't say 'Huh.' Chuck, I'm taking you to a brand new planet. If you try, you can probably get rich. Then maybe you can tell me why a man with money can command luxuries that poor people can't."

"But we aren't poor!"

"No, we are not. But we aren't rich either. Maybe you've got the drive to get rich. One thing is sure: on Venus the opportunities are all around you. Never mind — how about a game before dinner?"

Charlie still resented being shut out of the nicest parts of the ship — he had never felt like a second-class anything (citizen, or passenger) before in his life; the feeling was not pleasant. He decided to get rich on Venus. He would make the biggest uranium strike in history; then he would ride first class between Venus and Earth whenever he felt like it — that would teach those stuck-up snobs!

He then remembered he had already decided to be a famous spaceman. Well, he would do both. Someday he would own a space line ... and one of the ships would be his private yacht. But by the time the *Hesperus* reached the halfway point he no longer thought about it.

The emigrants saw little of the ship's crew, but Charlie got acquainted with Slim, the emigrants' cook. Slim was called so for the reason that cooks usually are; he sampled his own wares all day long and was pear shaped.

Like all space ships, the *Hesperus* was undermanned except for astrogators and engineers — why hire a cook's helper when the space can be sold to a passenger? It was cheaper to pay high wages to a cook who could perform production-line miracles without a helper. And Slim could.

But he could use a helper. Charlie's merit badge in cooking plus a willingness to do as he was told made him Slim's favorite volunteer assistant. Charlie got from it something to do with his time, sandwiches and snacks whenever he wanted them, and lots of knowledgeable conversation. Slim had not been to college but his curiosity had never dried up; he had read everything worth reading in several ship's libraries and had kept his eyes open dirtside on every inhabited planet in the Solar System.

"Slim, what's it like on Venus?"

"Mmm ... pretty much like the books say. Rainy. Hot. Not too bad at Borealis, where you'll land."

"Yes — but what's it *like*?"

"Why not wait and see? Give that stew a stir ... and switch on the shortwaver. Did you know that they used to figure that Venus couldn't be lived on?"

"Huh? No, I didn't."

" 'Struth. Back in the days when we didn't have space flight, scientists were certain that Venus didn't have either oxygen nor water. They figured it was a desert, with sand storms and no air you could breathe. Proved it, all by scientific logic."

"But how could they make such a mistake? I mean, obviously, with clouds all over it and —"

"The clouds didn't show water vapor, not through a spectroscope they didn't. Showed lots of carbon dioxide, though, and by the science of the last century they figured they had proved that Venus couldn't support life."

"Funny sort of science! I guess they were pretty ignorant in those days."

"Don't go running down our grandfathers. If it weren't for them, you and I would be squatting in a cave, scratching fleas. No, Bub, they were pretty sharp; they just didn't have all the facts. We've got more facts, but that doesn't make us smarter. Put them biscuits over here. The way I see it, it just goes to show that the only way to tell what's in a stew is to eat it ... and even then you aren't always sure. Venus turned out to be a very nice place. For ducks. If there were any ducks there. Which there ain't."

"Do you like Venus?"

"I like any place I don't have to stay in too long. Okay, let's feed the hungry mob."

The food in the *Hesperus* was as good as the living accommodations were bad. This was partly Slim's genius, but was also the fact that food in a space ship costs by its weight; what it had cost Earthside matters little compared with the expense of lifting it off Earth. The choicest steaks cost the spaceline owners little more than the same weight of rice — and any steaks left over could be sold at high prices to colonists weary .for a taste of Earth food. So the emigrants ate as well as the first class passengers, even though not with fine service and fancy surroundings. When Slim was ready he opened a shutter in the galley partition and Charlie dealt out the wonderful viands like chow in a Scout camp to passengers queued up with plates. Charlie enjoyed this chore. It made him feel like a member of the crew, a spaceman himself.

Charlie almost managed not to worry about Nixie, having told himself that there was nothing to worry about. They were a month past midpoint, with Venus only six weeks away before he discussed it with Slim. "Look, Slim, you know a lot about such things. Nixie'll make it all right ... won't he?"

"Hand me that paddle; Mmm ... don't know as I ever ran across a dog in space before. Cats now ... cats belong in space. They're clean and neat and help to keep down mice and rats."

"I don't like cats."

"Ever lived with a cat? No, I see you haven't. How can you have the gall not to like something you don't know anything about? Wait till you've lived with a cat, then tell me what you think. Until then ... well, who told you were entitled to an opinion?"

"Huh? Why, everybody is entitled to his own opinion!"

"Nonsense, Bub. Nobody is entitled to an opinion about something he is ignorant of. If the Captain told me how to bake a cake, I would politely suggest that he not stick his nose into my trade ... contrariwise, I never tell him how to plot an orbit to Mars."

"Slim, you're changing the subject. How about Nixie? He's going to be all right ... isn't he?"

"As I was saying, I don't have opinions about things I don't know. Happens I don't know dogs. Never had one as a kid; I was raised in a big city. Since then I've been in space. No dogs."

"Darn it, Slim! — you're being evasive: You know about sleep-freeze. I know you do."

Slim sighed. "Kid, you're going to die someday and so am I. And so is your pup. It's the one thing we can't avoid. Why, the ship's reactor could blow up and none of us would know what hit us till they started fitting us with haloes. So why fret about whether your dog comes out of sleep-freeze? Either he does and you've worried unnecessarily ... or he doesn't and there's nothing you can do about it."

"So you don't think he will?"

"I didn't say that. I said it was foolish to worry."

But Charlie did worry; the talk with Slim brought it to the top of his mind, worried him more and more as the day got closer. The last month seemed longer to him than the four dreary months that had preceded it.

As for Nixie, time meant nothing to him. Suspended between life and death, he was not truly in the *Hesperus* at all; but somewhere else, outside of time. It was merely his shaggy little carcass that lay, stored like a ham, in the frozen hold of the ship.

Eventually the Captain slowed his ship, matched her with Venus and set her in a parking orbit alongside Venus's single satellite station. After transshipment and maddening delay the Vaughns were taken down in the winged shuttle Cupid into the clouds of Venus and landed at the north pole colony, Borealis.

For Charlie there was a still more maddening delay: cargo (which

included Nixie) was unloaded after passengers and took many days because the mighty *Hesperus* held so much more than the little Cupid. He could not even go over to the freight sheds to inquire about Nixie as immigrants were held at the reception center for quarantine. Each one had received many shots during the five-month trip to inoculate them against the hazards of Venus; now they found that they must wait not only on most careful physical examination and observation to make sure that they were not bringing Earth diseases in with them but also to receive more shots not available aboard ship. Charlie spent the days with sore arms and gnawing anxiety.

So far he had had one glimpse outdoors — a permanently cloudy sky which never got dark and was never very bright. Borealis is at Venus's north pole and the axis of the planet is nearly erect; the unseen Sun circled the horizon, never rising nor setting by more than a few degrees. The colony lived in eternal twilight.

The lessened gravity, nine-tenths that of Earth, Charlie did not notice even though he knew he should. It had been five months since he had felt Earth gravity and the *Hesperus* had maintained only one-third gravity in that outer part, where spin was most felt. Consequently Charlie felt heavier than seemed right, rather than lighter — his feet had forgotten full weight.

Nor did he notice the heavy concentration (about 2%) of carbon dioxide in the air, on which Venus's mighty jungles depended. It had once been believed that so much carbon dioxide, breathed regularly, would kill a man, but long before space flight, around 1950, experiments had shown that even a higher concentration had no bad effects. Charlie simply didn't notice it.

All in all, he might have been waiting in a dreary, barracks-like building in some tropical port on Earth. He did not see much of his father, who was busy by telephone and by germproof conference cage, conferring with his new employers and arranging for quarters, nor did he see much of his mother; Mrs. Vaughn had found the long trip difficult and was spending most of her time lying down.

Nine days after their arrival Charlie was sitting in the recreation room of the reception center, disconsolately reading a book he had already read on Earth. His father came in. "Come along."

"Huh? What's up?"

"They're going to try to revive your dog. You want to be there, don't you? Or maybe you'd rather not? I can go ... and come back and tell you what happened."

Charlie gulped. "I want to be there. Let's go."

The room was like the one back at White Sands where Nixie had been put to sleep, except that in place of the table there was a cage-like contraption with glass sides. A man was making adjustments on a complex apparatus which stood next to the glass box and was connected to it. He looked up. "Yes? We're busy."

"My name is Vaughn and this is my son Charlie. He's the owner of the dog."

The man frowned. "Didn't you get my message? I'm Doctor Zecker, by the way. You're too soon; we're just bringing the dog up to temperature."

Mr. Vaughn said, "Wait here, Charlie," crossed the room and spoke in a low voice to Zecker.

Zecker shook his head. "Better wait outside."

Mr. Vaughn again spoke quietly; Dr. Zecker answered, "You don't understand. I don't even have proper equipment — I've had to adapt the force breather we use for hospital monkeys. It was never meant for a dog."

They argued in whispers for a few moments. They were interrupted by an amplified voice from outside the room "Ready with ninety-seven-X, Doctor — that's the dog."

Zecker called back, "Bring it in!" — then went on to Mr. Vaughn, "All right — keep him out of the way. Though I still say he would be better off outside." He turned, paid them no further attention.

Two men, came in, carrying a large tray. Something quiet and not very large was heaped on it, covered by dull blue cloth. Charlie whispered, "Is that Nixie?"

"I think so," his father-answered in a low voice. "Keep quiet and watch."

"Can't I *see* him?"

"Stay where you are and don't say a word — else the doctor will make you leave."

Once inside, the team moved quickly and without speaking, as if this were something rehearsed again and again, something that must be done with great speed and perfect precision. One of them opened the glass box; the other placed the tray inside, uncovered its burden. It was Nixie, limp and apparently dead. Charlie caught his breath.

One assistant moved the little body forward, fitted a collar around its neck, closed down a partition like a guillotine, jerked his hands out of the way as the other assistant slammed the glass door through

which they had put the dog in, quickly sealed it. Now Nixie was shut tight in a glass coffin, his head lying outside the end partition, his body inside. "Cycle!"

Even as he said it, the first assistant slapped a switch and fixed his eyes on the instrument board and Doctor Zecker thrust both arms into long rubber gloves passing through the glass, which allowed his hands to be inside with Nixie's body. With rapid, sure motions he picked up a hypodermic needle, already waiting inside, shoved it deep into the dog's side.

"Force breathing established."'

"No heart action, Doctor!"

The reports came one on top of the other, Zecker looked up at the dials, looked back at the dog and cursed. He grabbed another needle. This one he entered gently, depressed the plunger most carefully, with his eyes on the dials. "Fibrillation."

"I can see!" he answered snappishly, put down the hypo and began to massage the dog in time with the ebb and surge of the "iron lung."

And Nixie lifted his head and cried.

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It was more than an hour before Dr. Zecker let Charlie take the dog away. During most of this time the cage was open and Nixie was breathing on his own, but with the apparatus still in place, ready to start again if his heart or lungs should falter in their newly relearned trick of keeping him alive. But during this waiting time Charlie was allowed to stand beside him, touch him, sooth and pet him to keep him quiet.

At last the doctor picked up Nixie and put him in Charlie's arms. "Okay, take him. But keep him quiet; I don't want him running around for the next ten hours. But not too quiet, don't let him sleep."

"Why not, Doctor?" asked Mr. Vaughn.

"Because sometimes, when you think they've made it, they just lie down and quit — as if they had had a taste of death and found they liked it. This pooch has had a' near squeak — we have only seven minutes to restore blood supply to the brain. Any longer than that ... well, the brain is permanently damaged and you might as well put it out of its misery."

"You think you made it in time?"

"Do you think," Zecker answered angrily, "that I would let you take the dog if I hadn't?"

"Sorry."

"Just keep him quiet, but not too quiet. Keep him awake."

Charlie answered solemnly, "I will, Doctor Nixie's going to be all right — I know he is."

Charlie stayed awake all night long, talking to Nixie, petting him, keeping him quiet but not asleep. Neither one of his parents tried to get him to go to bed.

## Chapter Two

Nixie liked Venus. It was filled with a thousand new smells, all worth investigating, countless new sounds, each of which had to be catalogued. As official guardian of the Vaughn family and of Charlie in particular, it was his duty and pleasure to examine each new phenomenon, decide whether or not it was safe for his people; he set about it happily.

It is doubtful that he realized that he had traveled other than that first lap in the traveling case to White Sands. He took up his new routine without noticing the five months clipped out of his life; he took charge of the apartment assigned to the Vaughn family, inspected it thoroughly, then nightly checked it to be sure that all was in order and safe before he tromped out his place on the foot of Charlie's bed and tucked his tail over his nose.

He was aware that this was a new place, but he was not homesick. The other home had been satisfactory and he had never dreamed of leaving it, but this new home was still better. Not only did it have Charlie — without whom no place could be home — not only did it have wonderful odors, but also he found the people more agreeable. Iii the past, many humans had been quite stuffy about flower beds and such trivia, but here he was almost never scolded or chased away; on the contrary people were anxious to speak to him, pet him, feed him. His popularity was based on arithmetic: Borealis had fifty-five thou. sand people but only eleven dogs; many colonists were homesick for man's traditional best friend. Nixie did not know this, but he had great capacity for enjoying the good things in life without worrying about why.

Mr. Vaughn found Venus satisfactory. His work for Synthetics of Venus, Ltd. was the sort of work he had done on Earth, save that he was now paid more and given more responsibility. The living quarters provided by the company were as comfortable as the house he had left back on Earth and he was unworried about the future of his family for the first time in years.

Mrs. Vaughn found Venus bearable but she was homesick much of the time.

Charlie, once he was over first the worry and then the delight of waking Nixie, found Venus interesting, less strange than he had expected, and from time to time he was homesick. But before long he was no longer homesick; Venus was home. He knew now what he wanted to be: a pioneer. When he was grown he would head south, deep into the unmapped jungle, carve out a plantation.

The jungle was the greatest single fact about Venus. The colony lived on the bountiful produce of the jungle. The land on which Borealis sat, buildings and spaceport, had been torn away from the hungry jungle only by flaming it dead, stabilizing the muck with gel-forming chemicals, and poisoning the land thus claimed — then flaming, cutting, or poisoning any hardy survivor that pushed its green nose up through the captured soil.

The Vaughn family lived in a large apartment building which sat on land newly captured. Facing their front door, a mere hundred feet away across scorched and poisoned soil, a great shaggy dark-green wall loomed higher than the buffer space between. But the mindless jungle never gave up. The vines, attracted by light — their lives were spent competing for light energy — felt their way into the open space, tired to fill it. They grew with incredible speed. One day after breakfast Mr. Vaughn tried to go out his own front door, found his way hampered. While they had slept a vine had grown across the hundred-foot belt, supporting itself by tendrils against the dead soil, and had started up the front of the building.

The police patrol of the city were armed with flame guns and spent most of their time cutting back such hardy intruders. While they had power to enforce the law, they rarely made an arrest. Borealis was a city almost free of crime; the humans were too busy fighting nature in the raw to require much attention from policemen.

But the jungle was friend as well as enemy. Its lusty life offered food for millions and billions of humans in place of the few thousands already on Venus. Under the jungle lay beds of peat, still farther down were thick coal seams representing millions of years of lush jungle growth, and pools of oil waiting to be tapped. Aerial survey by jet-copter in the volcanic regions promised uranium and thorium when man could cut his way through and get at it. The planet offered unlimited wealth. But it did not offer it to sissies.

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Charlie quickly bumped his nose into one respect in which Venus

was not for sissies. His father placed him in school, he was assigned to a grade taught by Mr. deSoto. The school room was not attractive — "grim" was the word Charlie used, but he was not surprised, as most buildings in Borealis were unattractive, being constructed either of spongy logs or of lignin panels made from jungle growth.

But the school itself was "grim." Charlie had been humiliated by being placed one grade lower than he had expected; now he found that the lessons were stiff and that Mr. deSoto did not have the talent, or perhaps the wish to make them fun. Resentfully, Charlie loafed.

After three weeks Mr. deSoto kept him in after school. "Charlie, what's wrong?"

"Huh? I mean, 'Sir?"

"You know what I mean. You've been in my class nearly a month. You haven't learned anything. Don't you want to?"

"What? Why, sure I do."

"Surely' in that usage, not 'sure.' Very well, so you want to learn; why haven't you?"

Charlie stood silent. He wanted to tell Mr. deSoto what a swell place Horace Mann Junior High School had been, with its teams and its band and its student plays and its student council (this crazy school didn't even *have* a student council!), and its study projects picked by the kids themselves, and the Spring Outburst and Sneak Day ... and — oh, shucks!

But Mr. deSoto was speaking. "Where did you last go to school, Charlie?"

Charlie stared. Didn't the teacher even bother to read his transcript? But he told him and added, "I was a year farther along there. I guess I'm bored, having to repeat."

"I think you are, too, but I don't agree that you are repeating. They had an eighteen-year Jaw there, didn't they?"

"Sir?"

"You were required to attend school until you were eighteen Earth-years old?"

"Oh, that! Sure. I mean 'surely.' Everybody goes to school until he's eighteen. That's to 'discourage juvenile delinquency," he quoted.

"I wonder. Nobody ever flunked, I suppose."

"Sir?"

"Failed. Nobody ever got tossed out of school or left back for

failing his studies?"

"Of course not, Mr. deSoto. You have to keep age groups together, or they don't develop socially as they should."

"Who told you that?"

"Why, everybody knows that. I've been hearing that ever since I was in kindergarten. That's what education is for — social development."

Mr. deSoto leaned back, rubbed his nose. Presently he said slowly; "Charlie, this isn't that kind of a school at all."

Charlie waited. He was annoyed at not being invited to sit down and was wondering what would happen if he sat down anyway.

"In the first place we don't have the eighteen-year rule. You can quit school today. You know how to read. Your handwriting is sloppy but it will do. You are quick in arithmetic. You can't spell worth a hoot, but that's your misfortune; the city fathers don't care whether you learn to spell or not. You've got all the education the City of Borealis feels obliged to give you. If you want to take a flame gun and start carving out your chunk of the jungle, nobody is standing in your way. I can write a note to the Board of Education, telling them that Charles Vaughn, Jr. has gone as far as he ever will. You needn't come back tomorrow."

Charlie gulped. He had never heard of anyone being dropped from school for anything less than a knife fight. It was unthinkable — what would his folks say?

"On the other hand," Mr. deSoto went on, "Venus needs educated citizens. We'll keep anybody as long as they keep learning. The city will even send you back to Earth for advanced training if you are worth it, because we need scientists and engineers ... and more teachers. But this is a struggling new community and it doesn't have a penny to waste on kids who won't study. We *do* flunk them in this school. If you don't study, we'll lop you off so fast you'll think you've been trimmed with a flame gun. We're not running the sort of overgrown kindergarten you were in. It's up to you. Buckle down and learn ... or get out. So go home and talk it over with your folks."

Charlie was stunned. "Uh ... Mr. deSoto? Are you going to talk to my father?"

"What? Heavens, no! You are their responsibility, not mine. I don't care what you do. That's all. Go home."

Charlie went home, slowly. He did not talk it over with his parents. Instead he went back to school and studied. In a few weeks

he discovered that even algebra could be interesting ... and that old Frozen Face was an interesting teacher when Charlie had studied hard enough to know what the man was talking about.

Mr. deSoto never mentioned the matter again.

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Getting back in the Scouts was more fun but even Scouting held surprises. Mr. Qu'an, Scoutmaster of Troop Four, welcomed him heartily. "Glad to have-you, Chuck. It makes me feel good when a Scout among the new citizens comes forward and says be wants to pick up the Scouting trail again." He looked over the letter Charlie had brought with him. "A good record — Star Scout at your age. Keep at it and you'll be a Double Star ... both Earth and Venus."

"You mean," Charlie said slowly, "that I'm not a Star Scout here?"

"Eh? Not at all." Mr. Qu'an touched the badge on Charlie's jacket. "You won that fairly and a Court of Honor has certified you. You'll always be a Star Scout, just as a pilot is entitled to wear his comet after he's too old to herd a space ship. But let's be practical. Ever been out in the jungle?"

"Not yet, sir. But I always was good at woodcraft."

"Mmm ... Ever camped in the Florida Everglades?"

"Well ... no sir."

"No matter. I simply wanted to point out that while the Everglades are jungle, they are an open desert compared with the jungle here. And the coral snakes and water moccasins in the Everglades are harmless little pets alongside some of the things here. Have you seen our dragonflies yet?"

"Well, a dead one, at school."

"That's the best way to see them. When you see a live one, better see it first, ... if it's a female and ready to lay eggs."

"Uh, I know about them. If you fight them off, they won't sting."

"Which is why you had better see them first."

"Mr. Qu'an? Are they really that big?"

"I've seen thirty-six-inch wing spreads. What I'm trying to say, Chuck, is that a lot of men have died learning the tricks of this jungle. If you are as smart as a Star Scout is supposed to be, you won't assume that you know what these poor fellows didn't. You'll wear that badge ... but you'll class yourself in your mind as a tenderfoot ,all over again, and you won't be in a hurry about promoting yourself."

Charlie swallowed it. "Yes, sir. I'll try."

"Good. We use the buddy system — you take care of your buddy and he takes care of you. I'll team you with Hans Kuppenheimer. Hans is only a Second Class Scout, but don't let that fool you. He was born here and he lives in the bush, on his father's plantation. He's the best jungle rat in the troop."

Charlie said nothing, but resolved to become a real jungle rat himself, fast. Being under the wing of a Scout who was merely second class did not appeal to him.

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But Hans turned out to be easy to get along with. He was quiet, shorter but stockier than Charlie, neither unfriendly nor chummy; he simply accepted the assignment to look after Charlie. But he startled Charlie by answering, when asked, that he was twenty-three years old.

It left Charlie speechless long enough for him to realize that Hans, born here, meant Venus years, each only two hundred twenty-five Earth days. Charlie decided that Hans was about his own age, which seemed reasonable. Time had been a subject which had confused Charlie ever since his arrival. The Venus day was only seven minutes different from that of Earth — he had merely had to have his wristwatch adjusted. But the day itself had not meant what it used to mean, because day and night at the north pole of Venus looked alike, a soft twilight.

There were only eight months in the year, exactly four weeks in each month, and an occasional odd 'Year Day" to even things off. Worse still, the time of year didn't mean anything; there were no seasons, just one endless hot, damp summer. It was always the same time of-day, always the same time of year; only clock and calendar kept it from being the land that time forgot. Charlie never quite got used to it.

If Nixie found the timelessness of Venus strange he never mentioned it. On Earth he had slept at night simply because Charlie did so, and, as for seasons, he had never cared much for winter anyhow. He enjoyed getting back into the Scouts even more than Charlie had, because he was welcome at every meeting. Some of the Scouts born on Earth had once had dogs; now none of them had — and Nixie was at once mascot of the troop. He was petted almost to exhaustion the first time Charlie brought him to a meeting, until Mr. Qu'an pointed out that the dog had to have some peace ... then squatted down and petted Nixie himself. "Nixie," he said musingly, "a nixie is a water sprite, isn't it?"

"Uh, I believe it does mean that," Charlie admitted, "but that isn't how he got his name."

"So?"

"Well, I was going to name him 'Champ,' but when he was a puppy I had to say 'Nix' to so many things he did that he got to thinking it was his name — and then it was."

"Mmm ... more logical than most names. And even the classical meaning is appropriate in a wet place like this. What's this on his collar? I see ... you've decorated him with your old tenderfoot badge."

"No, sir," Charlie corrected. "That's his badge."

"Eh?"

"Nixie is a Scout, too. The fellows in my troop back Earthside voted him into the troop. They gave him that. So Nixie is a Scout."

Mr. Qu'an raised his eyebrows and smiled. One of the boys said, "That's about the craziest yet. A dog can't be a Scout."

Charlie had doubts himself; nevertheless he was about to answer indignantly when the Scoutmaster cut smoothly in front of him. "What leads you to say that, Al!?"

"Huh? Well, gosh! It's not according to Scout regulations."

"It isn't? I admit it is a new idea, but I can't recall what rule it breaks. Who brought a Handbook tonight?" The Scribe supplied one; Mr. Qu'an passed it over to Alf Rheinhardt. "Dig in, Alf. Find the rule."

Charlie diffidently produced Nixie's letter of transfer. He had brought it, but had not given it to the Scribe. Mr. Qu'an read it, nodded and said, "Looks okay." He passed the letter along to others and said, "Well, Al!?"

"In the first place, it says here that you have to be twelve years old to join — Earth years, that is, 'cause that's where the Handbook was printed. Is that dog that old? I doubt it."

Mr. Qu'an shook his head. "If I were sitting on a Court of Honor, I'd rule that the regulation did not apply. A dog grows up faster than a boy."

"Well, if you insist on joking — and Scouting is no joke to me — that's the point: a dog can't be a Scout, because he's a *dog*."

"Scouting is no joke to me either, Alf — though I don't see any reason not to have fun as we go. But I wasn't joking. A candidate comes along with a letter of transfer, all regular and proper. Seems to me you should go mighty slow before you refuse to respect an official

act of another troop. All you've said is that Nixie is a dog. Well, didn't I see somewhere — last month's *Boys' Life*, I think — that the Boy Scouts of Mars had asked one of the Martian chiefs to serve on their planetary Grand Council?"

"But that's not the same thing!"

"Nothing ever is. But if a Martian — who is certainly not a human being — can hold the highest office in Scouting, I can't see how Nixie is disqualified simply because he's a dog. Seems to me you'll have to show that he can't or won't do the things that a Tenderfoot Scout should do."

"Uh ..." Alf grinned knowingly. "Let's hear him explain the Scout Oath."

Mr. Qu'an turned to Charlie. "Can Nixie speak English?"

"What? Why, no, sir — but he understands it pretty well."

The Scoutmaster turned back to Alf. "Then the 'handicapped' rule applies, Alf — we never insist that a Scout do something he can't do. If you were crippled or blind, we would change the rules to fit you. Nixie can't talk words ... so if you want to quiz him about the Scout Oath, you'll have to bark. That's fair, isn't it, boys?"

The shouts of approval didn't sit well with Alf. He answered sullenly, "Well, at least he has to follow the Scout Law — *every* Scout has to do *that*."

"Yes," agreed the Scoutmaster soberly. "The Scout Law is the essence of Scouting. If you don't obey it, you aren't a Scout, no matter how many merit badges you wear. Well, Charlie? Shall we examine Nixie in Scout Law?"

Charlie bit his lip. He was sorry that he hadn't taken that badge off Nixie's collar. It was mighty nice that the fellows back home had voted Nixie into the troop... but with this smart Aleck trying to make something of it — Why did there always have to be one in every troop who tried to take the fun Out of life?

He answered reluctantly, "All right."

"Give me the Handbook. Is Nixie trustworthy?"

"Sure he is!"

"How?"

"Well ... he doesn't get on furniture even if you're not watching him ... and he won't touch food unless he's told to, and uh ..."

"I think that's enough. Is he loyal?"

"He's loyal to *me*."

"Mmm ... good enough. Helpful?"

"Uh, there isn't a whole lot he can do, I guess. He used to fetch newspapers in — but he can't do that here. He'll fetch anything you ask him to, if he understands what it is.

" 'Friendly' — well, obviously. 'Courteous' — we'll pass him on that, seeing what he has put up with tonight. Kind?"

"He'll let a baby try to pull his tail off, or step on his face, and never snap or growl. Uh, he did used to be kind of rough on cats, but I taught him better."

"Obedient?"

"Want to see?" Charlie put him through hand signal orders, ending with standing at attention and saluting. The applause made Nixie tremble but he held it until Charlie signaled "At ease."

"Take note of that, Alf," Mr. Qu'an said drily, "next time I have to speak to you twice. 'Cheerful' — we can skip that; I'm sure his grin isn't faked. 'Thrifty' — well, we can hardly expect him to have a savings account."

"He buries bones."

"Mmm, I suppose that's the canine equivalent. Brave?"

"*I* think he is. I've seen him tackle a dog three times his size — and chase it out of our yard, too, back home — back Earthside."

"Clean?"

"Smell him. He had a bath just yesterday. And he's perfectly housebroken."

"All that is left is 'Reverent' — and I don't intend to try to discuss that with him. I rule that Nixie is at least a reverent as the rapscallions I've heard cussing around here when they didn't think I was listening. How about it, boys? Does he pass?"

Nixie was voted into Troop Four in his tenderfoot status unanimously ... Alfred Rheinhardt, Tenderfoot abstaining.

After the meeting the troop treasurer Buttonhole Charlie. "You want to pay your dues now, Chuck?"

"Huh? Oh, yeah, sure — I brought some money."

"Good." The other Scout accepted payment. "Here's your receipt."

"Just mark it down in your book."

"Take it. No tickee, no washee. I'm nasty about it — that's why they made me treasurer. Now about Nixie — You pay? Or do I speak to him?"

The other boy was not smiling and Charlie could not decide whether or not he was joking. He decided to play it just as soberly. "I settle for Nixie. You see, he doesn't have pockets." He dug down in his diminishing resources, managed to piece out enough to pay the small amount for Nixie. "Here."

"Thanks." The treasurer handed back a shilling. "Tenderfeet get by cheaper, under Troop by-laws. But every little bit helps. You know, when I took this job, the troop was in the hole. Now we got money in the bank."

"I believe it!" Charlie agreed. He was secretly delighted at the transaction. Nixie was no longer an honorary Scout," he was a Scout — he kept the Law and his dues were paid.

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Nixie's eligibility to take part in all troop doings was not questioned until the first hike thereafter. Mr. Qu'an looked troubled when Charlie showed up with him. "You had better take Nixie home. We'll wait for you."

Charlie was upset. "But, Mr. Qu'an, I thought — Well, Nixie always goes on hikes."

"No doubt, back Earthside. Charlie, I'm not being arbitrary. I don't want your dog to get hurt."

"He won't get hurt! He's real smart."

The Scoutmaster frowned. Hans Kuppenheimer spoke up. "I think Nixie could come along, Mr. Qu'an."

"Eh?" The Scoutmaster looked at Hans thoughtfully.

"You'll have your hands full with Chuck, since it's his first time out."

Hans had a habit of saying nothing when he had nothing to say; he did so now. Mr. Qu'an persisted, "You'd have to look out for them both, you know."

Hans still kept quiet. "Well," Mr. Qu'an said doubtfully, "Nixie is a member of the troop. If you can take care of him — and Charlie, too — I'll let him come."

"Yes, sir."

The Scoutmaster turned away. Charlie whispered, "Thanks, Hans.

That was swell." Hans said nothing.

Hans had surprised Charlie by his first reaction to Nixie the night Nixie had been taken into the troop. While other boys were clustering around making much of Nixie, Hans had stayed a wary distance away. Charlie had felt offended. Since he was assigned with Hans as a buddy team, Charlie decided to do something about it.

After the meeting he sought out Hans. "Don't be in a hurry, Hans. I want you to get acquainted with Nixie."

The country boy still avoided the dog. "Does it bite?"

"Huh? *Nixie*? Of course not. Well, he would if you took a poke at me. Not otherwise."

"I thought so. And suppose I gave you a friendly slap on the back. He could kill a man, huh?"

Nixie had listened, tense and watchful. He could feel the fear in Hans' mind; he understood, without understanding why, that his boy was arguing with this other boy. Charlie did not seem in immediate danger, but Nixie stayed at yellow alert.

It showed. The savage carnivores who were Nixie's remote ancestors showed in his stance and his watchful eyes. The Venus-born jungle rat, drilled since babyhood to keep his eyes open for just such unknown dangers could see the carnivore — and failed to see the gentle household pet. He watched the dog carefully.

Charlie said, "Why, that's nonsense, Hans. Pat him. Rough him up a bit. Shake hands with him. Let him learn your smell." When Hans still did not move Charlie asked incredulously, "Don't you *like* dogs?"

"I don't know. I've never seen one before, up close." Charlie's jaw dropped. But Hans had spoken the simple truth. Some town boys in the troop, immigrant like Charlie, had once owned dogs Earthside. Others had friends among the handful of dogs in Borealis. But Hans alone, born on Venus and living outside town, knew so little of dogs that they were as strange to him as a tiger shark would have been.

When Charlie finally got this incredible fact firmly in his mind he persisted even more strongly in his effort to get his team buddy acquainted with his other partner. Before Hans went home that night he had touched the dog, patted him, even picked him up and held him. Nixie could feel the fear go away, to be replaced by a sudden warm feeling. So Nixie snuffled Hans and licked his chin.

Hans showed up the next day at Charlie's home. He wanted to see Nixie.

In the two weeks that followed before the hike, Nixie adopted Hans as another member of Charlie's family. Subject always to his first loyalty, he accepted the other boy, took orders from him, even worked to hand signals, which he had never done with anyone but Charlie. At first he did it to please Charlie, but in time he was doing so because it was right and proper in his doggy mind, as long as it was all right with Charlie.

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The troop set out on the hike. Before they reached the jungle at the edge of town Hans said to Charlie, "Better have him heel."

"Why? He likes to run around and poke his nose into things. But he always stays in earshot. He'll come if he's called."

Hans scowled. "Suppose he can't? Maybe he goes into bush and doesn't come out. You want to lose him?"

This was a long speech for Hans. Charlie looked surprised, then called, "Nixie! Heel!"

The dog had been supervising the van; he turned and came at once to Charlie's left and rear. Hans relaxed, said, "Better," and placed himself so that the dog trotted between them.

When the jungle loomed up over them, pierced here by a road, Mr. Qu'an held up his arm and called out, "Halt! Check watches." He held up his wrist and waited; everybody else did the same.

Jock Quentin, an Explorer Scout equipped with two-way radio, spoke into his microphone, then said, "Stand by ... oh nine eleven."

"Anybody fail to check?" continued Mr. Qu'an. "All you with polarizers, establish base line."

Hans took out an odd-looking pair of spectacles with double lenses which rotated and a sighting device which snapped out. "Try it."

"Okay." Charlie accepted them gingerly. He did not yet own a light-polarizing sighter. "Why are we going to establish base line if we're going to stay on marked roads?"

Hans did not answer and Charlie felt foolish, realizing that the time to learn how not to get lost was before you got lost. He put on the polarizers and tried to establish base line.

"Base line" was the prime meridian of Venus, the direction from Borealis of the Sun at noon. To find that direction it was necessary first to find the Sun itself (in a grey, thickly overcast sky), then, using a watch, figure where the Sun would be at noon.

That direction would be south — but *all* directions from Borealis were south; the city lay on the north pole of the planet. The mapmakers used Borealis as a zero point and the direction of the Sun at noon as a base line with the aid of transceivers, radar beacons, and radio compass, they were gradually establishing a grid o reference points for the few hundred square mile around Borealis. A similar project was going on at South Pole City. But the millions of square miles between poles were unknown country, more mysterious and incredible vaster than any jungle on Earth. There was a saying among the Scouts that streams at the equator were "hot enough to boil eggs," but nobody knew. As yet, no ship had landed near the equator and managed to come back.

The difficulty of telling directions on Venus is very great. The stars are always invisible. Neither magnetic compasses nor gyro compasses were of any use at the poles. Nor is there moss on the north sides of trees, nor any shadows to read — Venus is not only the land that time forgot; it is also the place of no directions.

So the colonists were forced to establish new directions. From Borealis toward the Sun at noon was prime meridian, called "base line," and any direction parallel to that was "base." Back the other way was "reverse"; the two intermediate directions were "Left demi" and "right demi." By counting clockwise from "base," any other direction could be named.

It was not a perfect system since it used square coordinates for a spherical surface. But it was better than nothing in a place where the old directions had turned slippery — where all directions away from the city were "south" and where east and west, instead of being straight lines, were circular.

At first, Charlie could not see why, if they were going to use four directions, they didn't call them "north," "south," "east" and "west," instead of ringing in these silly names, "base," "reverse," "right demi," and "left demi." It was not until he saw in school a map of the colony, with the old familiar directions, north, south, east, west, on it and a "base line" grid drawn on top of it that he realized that the problem was not that simple. To go east on that map you went counterclockwise on one of those little circles — but how could you tell what direction "east" was unless you knew where you were? And how could you tell how much to curve left in order to keep going east? When compasses were no good and the Sun might be in any direction, north, south, east, or west, depending on which side of the city you were on?

So he buckled down and learned the new system.

Charlie put on Hans' polarizing spectacles and looked around. He could see nothing. Light leaked around the guards of the spectacles and the glass in front of his eyes seemed opaque. He knew that he should be able to pick out the Sun, for he knew that the light from the sky, dispersed by the clouds of Venus, was polarized, made to wiggle up-and-down or sideways, instead of in all directions. He knew that these spectacles were supposed to blank out polarized light, let him see the Sun itself. But he could not see anything.

He turned slowly, blind behind the spectacles.

Hey, it was getting brighter! He swung his head back and forth, made sure he was not mistaken. "I got it!"

"False sun," Hans announced dispassionately.

"Huh?"

"You're a hundred and eighty degrees out of phase," Mr. Qu'an's voice announced. "You're looking at the reflection of the Sun. Never mind, other people have made that mistake. But it's not a mistake you can afford to make even once out in the bush ... so keep trying·"

Charlie kept on turning — darn it, these specs fit so tight that he couldn't even see his feet! There it was again! Was it false sun? Or the Sun itself? How far had he turned?

He turned until he was dizzy, seeing brightness, then darkness, several times — and realized that one brightness was brighter than that which it alternated. Finally he stopped. "I'm looking at the Sun," he announced firmly.

"Okay," Hans admitted. "Jigger with it. Fine it down."

Charlie found that he could fiddle with screw settings on the sides of the spectacles and thereby kill the brightness almost completely. He did so, while swinging his head back and forth like a radar, trying to spot the smallest gleam that he could. "That's the best I can do."

"Hold still," Hans ordered. "Uncover your right eye. Mark me."

Charlie did as ordered, found himself staring with one eye down the sighter in front of the spectacles. Hans was thirty feet away, holding his Scout staff upright. "Don't move!" Hans cautioned. "Coach me on."

"Uh ... come right a couple of feet."

"Here?"

"I think so. Let me check." He covered his right eye again, but

found that his eye, dazzled by brighter light, could no longer pick up the faint gleam he had marked. "That's the best I can do."

Hans stretched a string along the marked direction. "My turn. Note your time." He took the spectacles, quickly gave Charlie a direction, coached him into place. The two lines differed by about ten degrees.

"Figure your hour angle," Hans said and looked at his watch.

The time was nine-thirty .. and the Sun moved fifteen degrees each hour ... two and a half hours to noon; that's thirty-seven and a half degrees and each minute on the face of his watch was six degrees, so — Charlie was getting confused. He looked up, saw that Hans had placed his watch on the ground and was laying out base line. Hans' watch had a twenty-four hour face; he simply pointed the hour hand at the Sun and the XII spot then pointed along base line.

No mental arithmetic, no monkeying around — "Gosh, I wish I had a watch like that!"

"Don't need it," Hans answered without looking up.

"But it makes it so simple. You just —"

"Your watch is okay. Make yourself a twenty-four-hour dial out of cardboard."

"That would work? Yeah, it would! I wish I had one now."

Hans fumbled in his duffel bag. "Uh, I made you one." He handed it over without looking up — a cardboard clock face, laid out for twenty-four hours.

Charlie was almost speechless. "Gee! Nixie, look at that! Say, Hans, I don't know how to thank you."

"Don't want you and Nixie getting lost," Hans answered gruffly.

Charlie took it, aimed nine-thirty along his line, marked noon and restretched the string to match. Base line, according to his sighting, differed by ten degrees from that of Hans. In the meantime, two patrol leaders had stretched a line at right angles to base line, along where the troop was spread out. One of them moved down the line, checking angles with a protractor. Mr. Qu'an followed, checked Charlie's layout himself. "About nine degrees off," he told Charlie. "Not bad for a first try."

Charlie felt crestfallen. He knew that he and Hans could not both be right but he had had a small hope that his answer was nearer the correct one. "Uh ... which way am I wrong?"

"Left-demi. Look at Hans — he's dead on ... as usual." The

Scoutmaster raised his voice. "All right, gang! Bush formation, route march. Flamers out, right and left. Rusty on point, Bill on drag — shake it up!"

"Heel, Nixie."

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The road cut straight through the jungle. The clearing had been flamed back wider than the road so that the jungle did not arch over it. The column kept to the middle where the ground was packed by vehicles running to and from outlying plantations. The flamers on the flanks, both of them Explorer Scouts, walked close to the walls of green and occasionally used their flame guns to cut back some new encroachment of vine or tree or grass. Each time they did so, they kept moving and a scavenger gang moved out, tossed the debris back into the living forest, and quickly rejoined the column. It was everybody's business to keep the roads open; the colony depended on roads more than Ancient Rome had depended on theirs.

Presently it began to rain. No one paid attention; rain was as normal as ice in Greenland. Rain was welcome; it washed off ever-present sweat and gave an illusion of coolness.

Presently Point (Rusty Dunlop) stopped, sighted back at Drag, and shouted, "Right demi fifteen degrees!"

Drag answered, "Check!" Point continued around the slight bend in the road. They had left Borealis heading "south" of course, since no other direction was possible, but that particular south was base thirty-two degrees right demi, to which was now added fifteen degrees clockwise.

It was Point's duty to set trail, keep lookout ahead, and announce his estimate of every change in direction. It was Drag's business to have eyes in the back of his head (since even here the jungle was not without power to strike), keep count of his paces, and keep written record of all course changes and the number of paces between each — dead reckoning navigation marked down in a waterproof notebook strapped to his wrist. He was picked for his reliability and the evenness of his strides.

A dozen other boys were doing the same things, imitating both Point and Drag, and recording everything, paces, times, and course changes, in preparation for Pathfinder merit badges. Each time the troop stopped, each would again establish base direction and record it. Later, after the hike, they would attempt to map where they-had been, using only their notes.

It was just practice, since the road was surveyed and mapped, but practice that could determine later whether they lived, or died miserably in the jungle. Mr. Qu'an had no intention of taking the troop, including tenderfoot town boys not yet twenty Venus years old, into unexplored jungle. But older boys, seasoned explorer Scouts did go into trackless bush; some were already marking out land they would claim and try to conquer. On their ability to proceed by dead reckoning through bush and swamp and return to where they had started depended both their lives and their future livelihoods.

Mr. Qu'an dropped back, fell in beside Charlie. "Counting paces?"

"Yes, sir."

"Where's your notebook?"

"Uh, it was getting soggy in the rain, so I put it away. I'm keeping track in my head."

"That's a fine way to wind up at South Pole. Next time, bring a waterproof one."

Charlie didn't answer. He had wanted one, as he had wanted a polarizing sighter and many other things. But the Vaughn family was still scratching for a toehold; luxuries had to wait.

Mr. Qu'an looked at Charlie. "If convenient, that is," he went on gently. "Right now I don't want you to count paces anyhow."

"Sir?"

"You can't learn everything at once, and today you can't get lost. I want you to soak up junglecraft. Hans, you two move to the flank. Give Charlie a chance to see what we're passing through. Lecture him about it, and for goodness' sake try to say more than two words at a time!"

"Yes, sir."

"And —" The Scoutmaster got no further; he was hailed by the boss of the scavenger gang. "Mr. Qu'an! Squint's got a screwbug!"

The man said something bitter under his breath, started to run. The two boys followed. The scavengers had been moving a large branch, freshly flamed down. Now they were clustered around one boy, who was gripping his forearm. Mr. Qu'an burst into the group, grabbed the kid by that arm without saying a word, and examined it.

He shifted his grip so that the skin was drawn tight at one spot, reached for his belt and drew a knife — dug the point into skin, and, as if he were cutting a bad spot out of an apple, excised a small chunk of flesh. Squint screwed up his face and tears came into his eyes, but

he did not cry out.

The scavenger boss had his first-aid kit open. As the Scoutmaster handed his knife to a boy near him, the gang boss placed a shaker bottle in Mr. Qu'an's hand. The Scoutmaster squirted powder into the wound, accepted a pressure patch and plastered it over the cut.

Then he turned sternly to the gang boss. "Pete, why didn't you do it?"

"Squint wanted you."

"So? Squint, you know better. Next time, let the boy closest to you get it — or cut it out yourself. It could have gone in another half inch while I was getting to you. And next time be more careful where you put your hands!"

The column had halted. Point. looking back, saw Mr. Qu'an's wave, lifted his own arm and brought it down smartly. They moved on. Charlie said to Hans, "What's a screwbug?"

"Little thing, bright red. Cling underneath leaves."

"What do they do to you?"

"Burrow in. Abscess. Don't get 'em out, maybe lose an arm."

"Oh." Charlie added, "Could they get on Nixie?"

"Doubt it. 'Cept maybe his nose. Ought to check him over every chance we get. Other things, too."

They were on higher and drier ground now; the bush around them did not go up so high. was not quite as dense. Charlie peered into it, trying to sort out details, while Hans kept up what he probably felt was a lively discourse — usually one word at a time, such as: "Poison," "Physic," or "Eat those."

"Eat what?" Charlie asked, when Hans had made the last comment. He looked where Hans pointed, saw nothing looking like fruit, berries or nuts.

"That stuff. Sugar stick." Hans thrust cautiously into the brush with his staff, pushed aside a Venus nettle, and broke off a foot of brown twig. "Nixie! Get out of there! Heel!"

Charlie accepted half of it, bit cautiously when he saw Hans do so.

It chewed easily. Yes, it did have a sweetish taste, about like corn syrup. Not bad!

Hans spat out pulp. "Don't swallow the cud — give you trouble."

"I wouldn't've guessed you could eat this."

"Never go hungry in the bush."

"Hans? What do you do for water? If you haven't got any?"

"Huh? Water all around you."

"Yeah, but *good* water."

"All water is good water ... if you clean it." Hans' eyes darted around. "Find a filter ball. Chop off top and bottom. Run water through. I'll spot one, show you."

Hans found one shortly, a gross and poisonous-looking fungus. But it was some distance off the clearing and when Hans started after it, he was told gruffly by the flamer on that flank to get back from the edge and stay there. Hans shrugged. "Later."

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The procession stopped in the road clearing, lunched from duffel bags. Nixie was allowed to run free, with strict instructions to stay away from the trees. Nixie didn't mind. He sampled every lunch. After a rest they went on. Occasionally they all gave way to let some plantation family, mounted on high trucks with great, low-pressure bolster wheels, roll past on the way to a Saturday night in town. The main road led past narrow tunnels cut into the bush, side roads to plantations. Late in the afternoon they passed one such; Hans hooked a thumb at it. "Home."

"Yours?"

"Half a mile in."

A couple of miles farther the troop left the road and started across country. But this was high land, fairly dry and semi-open, no more difficult than most forest back Earthside. Hans merely saw to it that Nixie stayed close at heel and cautioned Charlie, "Mind where you step... and if anything drops on you, brush it off quick."

They broke out shortly into a clearing, made camp, and started supper. The clearing was man-made, having been flamed down, although a green carpet had formed underfoot. The first step in making camp was to establish four corners of a rectangle, using Scout staffs; then Jock Quentin, the troop's radioman, clamped mirrors to them. After much fiddling he had a system rigged by which a powerful flashlight beam bounced around the rectangle and back into a long tube which housed a photocell; the camp was now surrounded by an invisible fence. Whenever the beam was broken an alarm would sound.

While this was going on other Scouts were lashing staffs together,

three to a unit, into long poles. Rags were sopped with a sickly-sweet fluid, fastened to the ends and the poles were erected, one at each corner of the rectangle. Charlie sniffed and made a face, "What's that stuff'?"

"For dragonflies. They hate it."

"I don't blame 'em!"

"Haven't seen one lately. But if they were swarming, you'd rub it on your hide and be glad of the stink."

"Hans? Is it true that a dragonfly sting can paralyze a man?"

"No."

"Huh? But they say —"

"Takes three or four stings. One sting will just do for an arm or a leg — unless it gets you in the spine."

"Oh." Charlie couldn't see much improvement.

"I was stung once," Hans added.

"You *were*? But you're still alive."

"My paw fought it off and killed it. Couldn't use my left leg for a while."

"Boy! You must be lucky."

"Unlucky, I'd say. But not unlucky as it was. We ate it."

"You *ate* it?"

"Sure. Mighty tasty, they are."

Charlie felt queasy. "You eat *insects*?"

Hans thought about it. "You ever eat a lobster?"

"Sure. But that's different."

"It sure is. Seen pictures of lobsters. Disgusting."

This gourmets' discussion was broken up by the Scoutmaster. "Hans! How about scaring up some oil weed?"

"Okay." Hans headed far the bush. Charlie followed and Nixie trotted after. Hans stopped. "Make him stay behind. We can't gather weed and watch him, too."

"All right."

Nixie protested, since it was his duty to guard Charlie. But once he understood that Charlie meant it and would not be swayed, he trotted back, tail in air, and supervised campmaking.

The boys went on. Charlie asked, "This clearing ... is it the regular Scout camp?"

Hans looked surprised. "I guess so. Paw and I aren't going to set a crop till we flame it a few more times."

"You mean it's *yours*? Why didn't you say so?"

"You never asked." Presently he added, "Some planters, they don't like Scouts tromping around, maybe hurting a crop."

Oil weed was a low plant, resembling bracken. They gathered it in silence, except once when Hans brushed something off Charlie's arm. "Want to watch that."

While they were loading with weed Hans made quite a long speech: "These dragonflies, they aren't much. You hear them coming. You can fight 'em off, even with your hands, because they can't sting till they light. They won't sting anyway, except when they're swarming — then it's just females, ready to lay eggs." He added thoughtfully, "They're stupid, they don't know the eggs won't hatch in a man."

"They won't?"

"No. Not that it does the man much good; he dies anyway. But they think they're stinging a big amphibian, thing called kteela."

"I've seen pictures of kteela."

"So? Wait till you see one. But don't let it scare you. Kteela can't hurt you and they're more scared than you are — they just look fearsome." He brushed at his arm. "It's little things you got to watch."

Oil weed burned with a clear steady flame; the boys had a hot dinner and hot tea. No precautions were taken against fire; of the many hazards on Venus, fire was not one. The problem was to get anything to burn, not to avoid forest lire.

After they had eaten, one boy was examined by Mr. Qu'an in first-aid and artificial respiration. Listening, Charlie found that there was much that he must 1-earn and unlearn; conditions were different. Then Rusty Dunlop broke out a mouth organ and they sang.

Finally Mr. Qu'an yawned and said, "Sack in, Scouts. Hard day tomorrow. Pedro, first watch — then rotate down the list."

Charlie thought he would never get to sleep. The ground underneath his waterproof was not hard, but he was not used to sleeping with lighted sky in his eyes. Besides that, he was acutely aware of strange noises in the bush around them.

He was awakened by a shout. "Dragons! Heads up, gang! Watch

yourself!"

Without stopping to think, Charlie reached down, grabbed Nixie to his chest, then looked around. Several boys were pointing. Charlie looked and thought at first that he was seeing a helicopter.

Suddenly it came into perspective and he realized that it was an enormous insect ... unbelievably huge, larger than had been seen on Earth since the Carboniferous period, a quarter of a billion years ago.

It was coming toward camp. Something about it — its wings? — made a whining buzz.

It approached the tall poles with the smelly rags, hesitated, turned away. Mr. Qu'an looked thoughtfully after it, glanced at Hans.

"They're not swarming," Hans stated positively. "Anyhow, that was a male."

"Mmm .... No doubt you're right. Still — double guard the rest of the night, down the roster. Tenderfeet makee-learnee only." He lay down.

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The troop started back the next morning — "Morning" by clock; Charlie, awakening stiff and sleepy to the same dull-bright, changeless sky, felt as if he had napped too long but not well during an afternoon. They headed back the way they had come. Once on the cleared road, Hans left Charlie and looked up the Scoutmaster. He was back shortly, grinning. "Stay overnight with me? You and Nixie?"

"Gee! Is it okay? Your folks won't mind?"

"They like company. You can ride in with Paw in the morning."

"It 'ould be swell, Hans ... but how about my folks? Uh, do you suppose Jock could raise 'em on the portable?"

"Everything's okay. Mr. Qu'an will phone 'em when the troop gets in ... and you can call them soon as we get to my place. If they holler, I can still catch you up with the troop."

So it was settled. When they got to the little side road for the Kuppenheimer plantation Mr. Qu'an ordered them to head for the house and no monkey business. They solemnly agreed and left the troop.

The side road was a dark tunnel; Hans hurried them through it. A few hundred yards farther on they came out into cultivated fields and Hans slowed down. "That's the only bad stretch. You okay?"

"Sure."

"Let's check Nixie."

If anything had attached itself to Nixie, they could not find ir and his wagging tail gave no sign of distress; they went on. Charlie looked around with interest. "What are you cropping?"

"Jungle bread on the right. Once it's established you don't have to worry about it, smothers anything else, mostly. Other side is mutated bananas. They take more care."

Shortly they came to the house, on a rise and with no growth around it — a typical Venus settler's house, long and low and built of spongy logs and native bamboo. Hans' mother greeted Charlie as if he were a neighbor boy, seen daily, and she petted Nixie. "He minds me of a hund I had in Hamburg." Then she set out banana cake and mugs of coffee that were mostly milk. Nixie had his cake on the floor.

There were several kids around, younger than Hans and looking like him. Charlie did not get them straight, as they talked even less than Hans did and hung back from Nixie — unlike their mother, they found him utterly strange. But presently, seeing how the. monster behaved with Hans and with their mother, they timidly patted him. After that, Nixie was the center of attention while they continued shyly to ignore Charlie.

Hans bolted his cake, hurried out. He was back a few minutes later. "Maw, where's the flamer?"

"Paw is using it."

Hans looked blank. "Well ... we don't have to have it. Come on, Chuck." He carried two hefty machetes, a blade in each hand; he handed one to Charlie.

"Okay." Charlie stood up. "Thanks, Mrs. Kuppenheimer — thanks a lot."

"Call me 'Maw'."

"Hurry up, Charlie."

"Right. Say — how about that call to my folks?"

"I forgot! Maw, would you phone Mrs. Vaughn? Tell her Chuck is staying all night?"

"Yes, surely. What's your frequency, Charlie?"

"Uh, you have to call city exchange and ask them to relay."

"Jawohl. You boys run along."

They headed off through the fields. Nixie was allowed to run, which be did with glee, returning every thirty seconds or so to see that

his charges had not fainted nor been kidnapped in his absence.

"Where are we going, Hans?"

Hans' eyes brightened. "To see the prettiest plantation land on Venus!"

"It's mighty pretty, no doubt about it."

"Not Paw's land. I mean my plantation."

"Yours?"

"Will be mine. Paw posted an option bond. When I'm old enough, I'll prove it." He hurried on.

Shortly Charlie realized that he was lost even though they were in a cultivated grove. "Hold it, Hans! Can I borrow your polarizer?"

"What for?"

"I want to establish base, that's what. I'm all mixed up."

"Base is that direction," Hans answered, pointing with his machete. "My polarizer is at the house. We don't need it."

"I just thought I ought to keep straight."

"Look, Chuck, I can't get lost around here; I was born on this piece."

"But I wasn't."

"Keep your eyes open; you'll learn the landmarks. We're heading that way —" Hans pointed again. "— for that big tree." Charlie looked, saw several big trees. "We cut over a ridge. Pretty soon we come to my land. Okay?"

"I guess so."

"I won't let you get lost. Look, I'll show you the bush way to establish base — polarizers are for townies." He looked around, his quick eyes picking up and discarding details. "There's one."

"One what?"

"Compass bug. Right there. Don't scare him. Back, Nixie!"

Charlie looked, discovered a small, beetle-like creature with striped wing casings. Hans went on, "When they fly, they take right off toward the Sun. Every time. Then they level off and head home — they live in nests." Hans slapped the ground beside the little creature; it took off as if jet propelled. "So the Sun is that way. What time is it?"

"Ten thirty, about."

"So where is base?"

Charlie thought about it. "Must be about there."

"Isn't that the way I pointed? Now find another compass bug. Always one around, if you look."

Charlie found one — frightened it, watched it take off in the same direction as the first. "You. know, Hans," he said slowly, "bees do something like that — fly by polarized light, I mean. That's the way they get back to their hives on cloudy days. I read about it."

"Bees? Those Earth bugs that make sugar?"

"Yes. But they aren't bugs."

"Okay," Hans answered indifferently. "I'll never see one. Let's get moving."

Presently they left cultivation, started into bush. Hans required Nixie to heel. Even though they were going uphill, the bush got thicker, became dense jungle. Hans led the way, occasionally chopping an obstacle.

He stopped. "Trash!" he said bitterly.

"Trouble?"

"This is why I wanted the flamer. This bit grows pretty solid."

"Can't we chop it?"

"Take all day with a bush knife; need heat on it. Going to have to poison this whole stretch 'fore I get a road through from Paw's place to mine."

"What do we do?"

"Go around, what else?" He headed left. Charlie could not see that Hans was following any track, decided he must know his way by the contour of the ground. About half an hour later Hans paused and whispered, "Keep quiet. Make Nixie keep quiet."

"What for?" Charlie whispered back.

"Good chance you'll see kteela, if we don't scare them." He went noiselessly ahead, with the other boy and the dog on his heels. He stopped. "There."

Charlie oozed forward, looked over Hans' shoulder — found that he was looking down at a stream. He heard a splash on his right, turned his head just in time to see spreading ripples. "Did you see him?" asked Hans in a normal voice.

"Shucks, he was right *there*. A big one. Their houses are just

downstream. They often fish along here. Have to keep your eyes open, Chuck." Hans looked thoughtful. "Kteela are people."

"Huh?"

"They're people. Paw thinks so. If we could just get acquainted with them, we could prove it. But they're timid. Come on — we cross here." Hans descended the bank, sat down on muddy sand by running water and started taking his shoes off. "Mind where you sit."

Charlie did the same. Bare-footed and bare-legged, Hans picked up Nixie. "I'll lead. This stretch is shallow, keep moving and don't stumble."

The water was warm and the bottom felt mucky; Charlie was glad when they reached the far side. "Get the leeches off," Hans commanded as he put Nixie down. Charlie looked down at his legs, was amazed to find half a dozen purple blobs, large as hens' eggs, clinging to him. Hans cleaned his own legs, helped Charlie make sure that he was free of the parasites. "Run your fingers between your toes. Try to get the sand fleas off as you put on your boots, too — though they don't really matter."

"Anything else in that water?" Charlie asked, much subdued.

"Oh, glass fish can bite a chunk out of you ... but they aren't poisonous. Kteela keep this stream cleaned up. Let's go."

They went up the far side, reached a stretch that was higher and fairly dry. Charlie thought that they were probably-going upstream, he could not be sure.

Hans stopped suddenly. "Dragonfly. Hear it?"

Charlie listened, heard the high, motor-like hum he had heard the night before. "There it is," Hans said quickly. "Hang onto Nixie and be ready to beat it off. I'm going to attract its attention."

Charlie felt that attracting its attention was in a class with teasing a rattlesnake, but it was too late to object; Hans was waving his arms.

The fly hesitated, veered, headed straight for him. Charlie felt a moment of dreadful anticipation — then saw Hans take one swipe with his machete. The humming stopped; the thing fluttered to the ground.

Hans was grinning. The dragonfly jerked in reflex, but it was dead, the head neatly chopped off. "Didn't waste a bit," Hans said proudly.

"Huh?"

"That's lunch. Cut some of that oil weed behind you." Hans

squatted down. In three quick slices he cut off the stinger and the wings; what was left was the size of a medium lobster. Using the chrome-sharp machete as delicately as a surgeon's knife, he split the underside of the exoskeleton, gently and neatly stripped out the gut. He started to throw it away, then paused and stared at it thoughtfully.

Charlie had been watching in queasy fascination. "Trouble?"

"Egg sac is full. They're going to-swarm."

"That's bad, isn't it?"

"Some. They swarm every three, four years." Hans' hesitated. "We'd better skip seeing my land. Got to tell Paw, so they'll keep the kids in."

"Okay, let's get started."

"We'll eat lunch first. Ten minutes won't matter — they aren't really swarming yet, or this one wouldn't have been alone."

Charlie started to say that he wasn't interested in lunch — not this lunch — but Hans was already starting a fire.

What was left in the exoskeleton was clean milky-white meat, lean flying muscle. Hans cut out chunks, toasted them over the fire, salted them from a pocket shaker. "Have some."

"Uh, I'm not hungry."

"You're crazy in the head, too. Here, Nixie." Nixie had been waiting politely but with his nose quivering. He snapped the tidbit out of the air, gulped it down, waited still more eagerly while Hans ate the next piece.

It did smell good ... and it looked good, when he kept his mind off the source. Charlie's mouth began to water. Hans looked up. "Change your mind?"

"Uh ... let me taste just a bite."

It reminded Charlie of crab meat. A few minutes later the exoskeleton was stripped too clean to interest even Nixie. Charlie stood up, burped gently, and said, "Ready?"

"Yeah. Uh, Chuck, one thing I do want to show you ... and there's a way back above it maybe quicker than the way we came."

"What is it?"

"You'll see." Hans headed off in a new direction. Charlie wondered how Hans had picked it without the aid of a compass bug.

In a few minutes they were going downhill. Hans stopped. "Hear it?"

Charlie listened, seemed to pick out a soft roar under the ever-present multiple voice of the jungle. "It's not a dragonfly?"

"Of course not. You've got ears."

"What is it?" Hans did not reply, led on. Presently they broke into a clearing, or rather a room, for the jungle closed in overhead. It enclosed a delightful, surprising waterfall; the muted roar was its song.

"Isn't that swell?"

"It sure is," Charlie agreed. "I haven't seen anything so pretty in years."

"Sure, it's pretty. But that's not the point. My land is just above. I'll put a water wheel here and have my own power." Hans led his two friends down near it, began to talk excitedly about his plans. The noise of falling water was so great that he had to shout.

So neither one of them heard it. Charlie heard Nixie bark, turned his head and saw it at the last moment. "Hans! Dragon!"

Too late — the thing nailed Hans between his shoulder blades. It laid no eggs; Charlie killed it, crushed it with his hands. But Hans had already been stung.

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Charlie wiped his trembling hands. on his pants and looked down at his chum. Hans had collapsed even as Charlie had killed the thing; he lay crumpled on the ground. Charlie bent over him. "Hans! Hans, answer me!"

Hans' eyelids fluttered. "Get Paw."

"Hans ... can you stand up?"

"Sorry ... Cbuck" — then very feebly, "My fault." His eyes stayed open, but Charlie could get no more out of him.

Even in his distress Charlie's training stayed with him. He could not find Hans' pulse, so he listened for his heart ... was rewarded and greatly relieved by a steady, strong flub-a-*dub*! ... flub-a-*dub*! Hans looked ghastly — but apparently it was true that they just paralyzed; they didn't kill.

But what to do?

Hans had said to get his father. Sure — but how? Could he find his way to the house? Even if he could, could he lead them back here? No, he wouldn't have to — surely Mr. Kuppenheimer would know where the waterfall was that Hans meant to harness. So what he had

to do was simply get back. Now let's see; they had come down the bank there — and after they had crossed the stream — it must be this same stream; they hadn't gone over any watershed. Or had they?

Well, it had better be the same stream, else he was lost beyond hope. Back through the bush, then and across the stream — How was he going to-cut back in and hit the stream at the place where it could be forded? The bush all looked pretty much alike.

Maybe he had better go downstream along the bank until he hit it. Then cross, and if he could find a compass bug, he could strike off in the general direction of the Kuppenheimers until he came to civilization. He remembered which way base was when they had first started out; that would orient him.

Or would it? They had gone first to that place that couldn't be passed without a flamer — but where had they gone then? How many turns? Which way were they heading when they reached the place where he had not quite seen a kteela?

Well, he would just have to try. At least he could get onto the same side of the stream as the plantation.

Nixie had been sniffing at Hans' still body. Now he began to whine steadily. "Shut up, you!" Charlie snapped. "I don't want any trouble out of you, too."

Nixie shut up.

Charlie decided that he couldn't leave Hans; he would have to take him with him. He kneeled down and started wrestling Hans' limp body into a fireman's carry, while wondering miserably whether or not Hans had told his mother where they were going? Or if it would do any good if he had, since they were not where Hans had originally intended to take them.

"Heel, Nixie."

An indefinitely long time later Charlie put Hans down on the ground in a fairly open place. It had taken only a few minutes of struggle to convince him that he could not carry Hans along the bank of the stream. A man might have been able to carve his way through with a machete — but while Charlie had two machetes he could not swing them and carry Hans as well. After giving that route up, he abandoned one machete by the waterfall, thinking that Hans could find it there some other day. He was tempted to abandon both, for the one on his belt was heavy and got in his way, but he decided that he might have to have it; they had done plenty of chopping in getting here.

So he set out again, this time trying to retrace their steps through the bush, hoping to spot the places they had chopped to help him find his way.

He never spotted such a sign; the living green maze swallowed all such puny marks.

After a long time he decided to go back to the familiar waterfall — he would stay there, nurse Hans, filter water for them all, and wait. Surely Mr. Kuppenheimer would eventually think of the waterfall!

So he turned back ... and could not find the waterfall. Not even the stream.

He walked through something. He couldn't see it, there were branches in his face. Whatever it was it clung to his legs like red-hot wires; he stumbled and almost dropped Hans getting free of it. Then his leg did not stop paining him. The fiery burning dropped off a little but a numbness crept up his right leg.

He was glad indeed to put Hans on the ground at the first fairly open place he came to. He sat down and rubbed his leg, then checked Hans — still breathing, heart still beating ... but out like a light.

Nixie sniffed Hans again, then looked up and whined inquiringly. "I can't help it," Charlie said to him. "He's a mess. I'm a mess. You're a mess, too."

Nixie barked.

"I will, I will ... just as soon as I can move. Don't hurry me. How would *you* like to carry him for a while?"

Charlie continued to rub his leg. The pain was going away but the numbness was worse. At last he said to Nixie, "I guess we ought to try it, pal. Wait a second while I look for a compass bug — the way I figure it, we came mostly base, so I guess we ought to try to head reverse." He glanced at his wrist to see what time it was.

His watch had stopped.

But it *couldn't* stop — it was self-winding.

Nevertheless it had. Perhaps he had banged it in the bush, perhaps ... no matter, it had stopped. He looked. for Hans' watch, thinking that its twenty-four-hour face was easier to use as a compass dial anyhow.

But Hans was not wearing his watch, nor was it in any of his pockets. Whether he had left it at the house, along with his polarizer and duffel bag, or whether it had dropped off while Charlie was carrying him, did not matter. They had no watch between them and Charlie did not know what time it was, not even approximately. It

seemed to him that he had been carrying Hans, fighting this dreary bush, for a week.

So a compass bug couldn't tell him anything.

He almost felt defeated at that moment. But he rallied, telling himself that if he went downhill he was bound to find that stream ... then he would either find the ford or the waterfall, one or the other. He hauled himself around into position to lift Hans, favoring his right leg.

He need not have bothered; his right leg was not working.

The "pins and needles" in it were almost unbearable, as if he had sat much too long in a cramped position. But they would not go away as they always had in the past; nothing he could do would make that leg obey his orders.

He lowered his head against Hans and bawled.

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He became aware that Nixie was licking his face and whining. He stopped his useless blubbering and raised his head. "It's all right, fellow. Don't you worry."

But it wasn't all right. While Charlie was no jungle rat, he did know that search parties could comb the area for weeks and not find them, could pass within feet of the spot and never see them. Possibly no human being had ever been where they were now; possibly no human would reach this spot in many years to come.

If he didn't use his head now, they would never get out! Nixie sat patiently, watching him, trusting him. "Nixie, this is up to you now, boy. You understand me?"

Nixie whined. "Go back to the house. Fetch! Fetch Maw. Fetch anybody. Right now! Go back to the house."

Nixie barked.

"Don't argue with me. You've got to do it. Go home. Go back and fetch somebody!"

Nixie looked dubious, trotted a few steps in the direction in which they had come, stopped and looked around inquiringly. "That's right! Keep going! Go back to the house! Fetch somebody! *Go!*"

Nixie looked sharply at him, then trotted away in businesslike fashion.

Sometime later Charlie raised his head and shook it. Gosh! He must have gone to sleep ... couldn't do that.

What if another dragonfly came along ... have to stay awake. Was Hans all right? Have to pick him up and get out of here ... where was Nixie? "Nixie!"

No answer. That was the last straw. But he'd have I get moving anyhow — His leg wouldn't work ... felt funny. "Nixie! *Nixie!*"

-

Mrs. Kuppenheimer heard the scratching and whining at the door, wiped her hands on her apron and went to open it. When she saw what was there she threw her hands up. "Lieber Gott! What happened to you?" She knelt swiftly, picked up the little dog and put him on her clean table, bent over him, talking to him and picking leeches from him, wiping away blood. "Schrecklich!"

"What happened to him, Mama?"

"I don't know." She went on working. But Nixie jumped Out of her arms, charged straight for the closed door, tried to crash his way out — unsuccessful, he leaped and clawed at it and howled.

Mrs. Kuppenheimer gathered him up and held his struggling body against her breast. "Gerta! Get Paw!"

"What's the matter with him, Mama?"

"Something dreadful has happened. *Run!*"

-

The Borealis council hall was filled with Scouts and older people. Hans and Charlie were seated in the front row, with Nixie on a chair between them. Hans had crutches across one knee; Charlie had a cane. Mr. Qu'an came down the aisle, saw them, and sat down as Charlie moved Nixie over to share his seat. The Scoutmaster said to Hans, "I thought you were off those things?" His glance touched the crutches.

"I am — but Maw made me bring them."

"I —" Mr. Qu'an stopped. An older man had just taken his place at a table in the front of the hall at which were seated half a dozen others.

"Quiet, please." The man waited a moment. "This Court of Honor is met in special session for awards. It is our first duty tonight — and proud pleasure — to award a life-saving medal. Will Tenderfoot Scout Nixie Vaughn please come forward?"

"*Now*, Nixie!" Charlie whispered.

Nixie jumped off the chair, trotted forward, sat at attention and saluted, trembling.

-

# Destination Moon

*Today, with space full of ships, colonies on the inner planets, and Earth's Moon so close that pilots on the Luna run sleep home nights, it is hard to imagine when "flying to the Moon" was a figure of speech for the impossible, when men who thought it could be done were visionaries, crackpots.*

*It is hard to realize the opposition they faced, to understand why they persisted, what they thought —*

*Farquharson, History of Transportation, III:* 414

## Chapter One

The Mojave Desert was gray with first morning light, but at the construction site lights were still burning in the office of the technical director. The office was quiet, save for petulant burbling of a pot of coffee.

Three men were present — the director himself, Doctor Robert Corley, Lincoln-tall and lean, Rear Admiral "Red" Bowles, regular navy retired, and Jim Barnes, head of Barnes Aircraft, Barnes Tool Works, other enterprises.

All three needed shaves; Barnes badly needed a haircut as well. Barnes was seated at Corley's desk; Bowles sprawled on a couch, apparently asleep and looking like a fat, redheaded baby; Doctor Corley paced the room, following a well worn pattern.

He stopped, and stared out the window. A thousand yards away on the floor of the desert a great ship, pointed and sleek, thrust up into the sky, ready to punch out through Earth's thick atmosphere.

Wearily he turned away and picked up a letter from the desk; it read:

-

*Reaction Associates, Inc.*

*Mojave, California.*

*Gentlemen:*

*Your request to test the engine of your atomic-powered rocket ship at the site of its construction is regretfully denied.*

*Although it is conceded that no real danger of atomic explosion exists,*

*a belief in such danger does exist in the public mind. It is the policy of the Commission* — Corley skipped down to the last paragraph: — *therefore, test is authorized at the Special Weapons Testing Center, South Pacific. Arrangements may be* —

-

He stopped and shoved the letter at Barnes. "If we've got to test at Eniwetok, we've got to find the money to do it."

Barnes' voice showed exasperation. "Doc, I've told you the syndicate won't put up another dime; there is no other money to be found."

"Confound it — we should have government money!"

Barnes grunted. "Tell that to Congress."

Without opening his eyes Bowles commented, "The United States is going to stall around and let Russia get to the Moon first — with hydrogen bombs. That's what you call 'policy.'"

Corley chewed his lip. "It's got to be *now*."

"I know it." Barnes got up and went to the window. The rising sun caught a highlight on the polished skin of the great ship. "It's got to be now," he repeated softly.

He turned and said, "Doc, when is the next favorable time to leave?"

"When we planned on it — next month."

"No, I mean this month."

Corley glanced at the wall calendar, dug into a bookcase for a well-thumbed volume, did a quick estimate. "Tomorrow morning — around four o'clock."

"That's it, then. We blast off tomorrow morning."

-

Admiral Bowles sat up with a jerk. "Blast off in an untested ship? Jim, you're crazy!"

"Probably. But now is the time — *now*. If we wait even a month, we will be tangled in some new snafu. That ship is ready, except for testing the power plant. So we'll skip the test!"

"But we haven't even selected a crew."

Barnes grinned. "*We're the crew*!"

Neither Corley nor Bowles answered. Barnes went on, "Why not?

The takeoff is automatic. Sure, we agreed that we should have young men, fast reflexes, and all that malarkey — and every damned one of us has been trying to figure out a reason why he should be included. You, Red, you sneaked off to Moffeatt Field and took a pilot's physical. Flunked it, too. Don't lie to me; I *know*. And you, Doc, you've been hinting that you ought to nurse the power plant yourself — you've been working on your wife, too."

"Eh?"

"She wanted me to say that the syndicate would object to your going. Don't worry; I didn't agree."

Corley looked at him levelly. "I've always intended to go. She knows that."

"That's my boy! Red?"

Bowles heaved himself to his feet. "Shucks, Jim, I didn't bust that physical much — just overweight."

"You're in. I don't want an eager young beaver as co-pilot anyhow."

"'Co-pilot?'"

"Want to rassle me for skipper? Red, I've meant to gun this crate myself ever since the day — Lordy, four years ago! — when you brought Doc to see me with a satchelful of blueprints." He drew a breath and looked around exultantly.

Bowles said, "Let's see. You for pilot; I'm co-; Doc is chief. That leaves nobody but the radarman. You can't possibly train a man in the electronics of that ship by tomorrow morning."

Barnes shrugged. "Hobson's choice — it has to be Ward." He named the chief electronics engineer of the project.

Bowles turned to Corley. "Does Ward hanker to go?" Corley looked thoughtful. "I'm sure he does. We haven't discussed it." He reached for the phone. "I'll call his quarters."

Barnes stuck a hand in the way. "Not so fast. Once the word got out, the Commission has twenty-four hours in which to stop us."

Bowles glanced at his watch. "Twenty-one hours."

"Long enough, anyhow."

Corley frowned. "We can't keep it secret. We've got to load that ship. I've got to reach Dr. Hastings and get our ballistic calculated."

"One thing at a time." Barnes paused, frowning.

"Here's the plan: we'll tell everybody that this is just a. dress

rehearsal, but complete in all details, road blocks, rations, reporters, check-off lists, the works. Doc, you get the power plant ready. Red, you're in charge of loading. Me, I'm going into Mojave and phone Hastings. Then I'll phone the University and arrange for the big computer."

"Why drive twenty miles?" Corley protested. "Call from here."

"Because these wires are probably tapped — and I don't mean the F.B.I.! Aside from us three and Ward, Hastings is the one man who *must* know the truth — when he figures that ballistic, he's got to know it matters."

Barnes reached for his hat. "Doc, you can call Ward now — here I go."

"Wait!" said Bowles. "Jim, you're going off half cocked. You can at least find out from here where Hastings is. You may have to fly down to Palomar and get him."

Barnes snapped his fingers. "I *am* half cocked, Red. I forgot the most important item — the reason why I can't use my plane myself; I need it for the Resident Inspector." He referred to the project representative of the Atomic Energy Commission.

"Holmes? Why does *he* need your plane?"

"To get lost in. I'm going to persuade Ned Holmes to go to Washington and make one last plea for us to be allowed to test our engine here. He'll do it; turning us down wasn't his idea. Our boy Andy will fly him in my plane — and Andy will be forced down in the desert, forty miles from a phone. Very sad."

Corley grudged a smile. "Sounds like kidnapping."

Barnes looked innocent.

"Of course Holmes will put the Commission's seal on the power pile before he leaves."

"And we'll break it. Any more objections? If not, let's get Andy, Holmes, and Ward, in that order."

Admiral Bowles whistled. "Doc," he said, "that engine of yours had better work, or we will spend the rest of our lives in jail. Well, let's get busy."

## Chapter Two

The morning was well worn by the time Jim Barnes drove back to the construction site. The company guard at the pass gate waved him through; he stopped nevertheless. "Howdy, Joe."

"Morning, Mr. Barnes."

"I see the gate is open. Any orders from the front office?"

"About the gate? No. Somebody called and said today was dress rehearsal for the Big Boy." The guard hooked a thumb toward the ship, two miles away.

"That's right. Now listen; this dress rehearsal must be letter perfect. Keep that gate locked. Clear with me, or Admiral Bowles, or Doctor Corley himself before unlocking it."

"Gotcha, Mr. Barnes."

"Just remember that there are people who would do anything to keep that ship over there from leaving the ground — and they don't necessarily have foreign accents."

"Don't worry, Mr. Barnes."

But he did worry; corking up the gate still left fourteen miles of unguarded fence.

Oh, well — it was a risk that must be accepted. He drove on past the living quarters, through the circle of shops. The area swarmed with people, on foot, in trucks, in jeeps. Trucks were lined up at the entrance to the bull pen surrounding the ship itself. Barnes pulled up at the administration building.

In Corley's office he found Bowles, Corley himself — and Corley's wife. Corley looked harassed; Mrs. Corley was quite evidently angry. "Greetings, folks," he said. "Am I butting in?"

Corley looked up. "Come in, Jim."

Barnes bowed to Mrs. Corley. "How do you do, ma'am?"

She glared at him. "You! You're responsible for this!"

"Me, Mrs. Corley? For what?"

"You know very well 'what'! Oh you . . . you . . ." She caught her breath, then gave vent to one explosive word: "Men!" She slammed out of the room.

When the door had closed behind her, Barnes let his eyebrows seek their natural level. "I see she knows. You shouldn't have told her, not yet, Doc."

"Confound it, Jim. I didn't expect her to kick up a fuss."

Bowles faced around in his chair. "Don't be a fool, Jim. Doe's wife *had* to know — wives aren't hired hands."

"Sorry. The damage is done. Doc, have you put any check on phone

calls?"

"Why, no."

"Do it. Wait, I'll do it." He stepped to the door. "Countess, call our switch board. Tell Gertie to switch all outgoing calls to you. You tell 'em firmly that outside lines are all in use, find out who it is, why they want to call, and whom — then tell the Director, Admiral Bowles, or me. Same for incoming calls."

He closed the door and turned back to Bowles.

"Your wife knows?"

"Of course."

"Trouble?"

"No. Navy wives get used to such things, Jim."

"I suppose so. Well, I got Hastings squared away. He says that he will be here with the tape not later than two in the morning. I've got a plane standing by for him."

Corley frowned. "That's cutting it fine. We ought to have more time to set up the autopilot."

"He says he can't promise it sooner. How about things here?"

"Loading is coming all right," answered Bowles, "provided the trucks with the oxygen aren't late."

"You should have flown it in."

"Quit uttering. The trucks are probably in Cajon Pass this minute."

"Okay, okay. Power plant, Doc?"

"I haven't broken Ned Holmes' seal on the atomic pile yet. The water tanks are filling, but they've just started."

He was interrupted by the telephone at his elbow. "Yes?"

His secretary's voice sounded in the room. "Your wife wants to call long distance, Doctor. I'm stalling her. Are you in?"

"Put her on," he said wearily. Mrs. Corley's words could not be heard, but her angry tones came through. Corley answered, "No, dear. . . That's right, dear. I'm sorry but that's how it is. . . no, I don't know when the lines will be free; we're holding them for calls placed to the east coast. . . no, you can't have the car; I'm using it. I —" He looked surprised and replaced the instrument. "She hung up on me."

"See what I mean?" said Barnes.

"Jim, you're a fool," Bowles answered.

"No, I'm a bachelor. Why? Because I can't stand the favorite sport of all women."

"Which is?"

"Trying to geld stallions. Let's get on with the job."

"Right," agreed Corley and flipped a key on his Teletalk. "Helen, call the electronics shop and tell Mr. Ward that I want to see him."

"Haven't you broken the news to him?" demanded Barnes.

"Ward? Of course."

"How did he take it?"

"Well enough. Ward is high strung. At first he insisted there wasn't time to get all the electronic gear ready."

"But he's in?"

"He's in." Corley stood up. "I've got to get back into the ship."

"Me, too," Bowles agreed.

Barnes followed them out. As they passed the desk of Corley's secretary she was saying, "One moment, puh*lease* — I'm ringing him." She looked up and pointed to Corley.

Corley hesitated. "Uh, uh," said Barnes, "if you let 'em tie you up on the phone, we'll never take off. I'm elected. Go on, you two. Get the buggy ready to go."

"Okay." Corley added to his secretary, "Got Mr. Ward yet?"

"Not in the electronics shop. I'm chasing him."

"I want him right away."

Barnes went back inside and spent an hour handling a logjam on the telephone. Personal calls he simply stalled on the excuse that the lines were needed for priority long distance calls. If a call was concerned with getting the ship ready to go, he handled it himself or monitored it. As best he could he kept the construction site an island, cut off from the world.

-

He straightened out a matter with the chief metallurgist, gave the accounting office an okay on some overtime of the week before, assured Associated Press that the "dress rehearsal" was worth full coverage, and gleefully extended an invitation to the Los Angeles Associated Civic Clubs to go through the ship — next week.

That done, he took Corley's dictaphone and began a memorandum

to his business manager on how to close the project in case (a) the trip was successful, (b) the ship crashed. He planned to mark it to be transcribed the following day.

A call from Dr. Corley interrupted him. "Jim? I can't find Ward."

"Tried the men's washrooms?"

"No — but I will."

"He can't be far away. Anything wrong in his department?"

"No, but I need him."

"Well, maybe he's finished his tests and gone to his quarters to catch some sleep."

"There's no answer from his quarters."

"Phone could be off the hook. I'll send someone to dig him out."

"Do that."

While he was arranging this, Herbert Styles, public relations chief for the project, came in. The press agent slumped down in a chair and looked mournful.

"Howdy, Herb."

"Howdy. Say, Mr. Barnes, let's you and me go back to Barnes Aircraft and quit this crazy dump."

"What's biting you, Herb?"

"Well, maybe you can make some sense out of what's going on. They tell me to get everybody in here by three A.M. — A.P., U.P., INS, radio chains, television trucks, and stuff. Then you lock the joint up like a schoolhouse on Sunday. And all this for a practice drill, a dry run. Who's crazy? Me or you?"

Barnes had known Styles a long time. "It's not a drill, Herb."

"Of course not." Styles ground out a cigarette. "Now how do we play it?"

"Herb, I'm in a squeeze. We're going to take off — at three fifty-three tomorrow morning. If word gets out before then, they'll find some way to stop us."

"Who's 'they'? And why?"

"The Atomic Energy Commission for one — for jumping off with an untested power-pile ship."

Styles whistled. "Bucking the Commission, eh? Oh, brother! But why not test it?"

Barnes explained, concluding with, "— so we can't test it. I'm busted, Herb."

"Isn't everybody?"

"That isn't all… Call it a hunch, or anything you like. If we don't take off now, we never will — even if I had the dinero to test in the South Pacific. We've had more than our share of bad luck on this project — and I don't believe in luck."

"Meaning?"

"There are people who want this enterprise to fail. Some are crackpots; some are jealous. Others —"

"Others," Styles finished for him, "don't like the United States getting space travel first any better than they liked us getting the atom bomb first."

"Check."

"So what do you want to guard against? A time bomb in the ship? Sabotage of the controls? Or the Federal marshal with a squad of soldiers to back him up?"

"I don't know!" Styles stared at nothing.

"Boss —"

"Yeh?"

"Item: pretty soon you've got to admit publicly that it's a real takeoff, for you've got to evacuate this valley. The sheriff and state police won't play games just for a drill."

"But —"

"Item: by now it is after office hours on the east coast. You're fairly safe from the Commission until morning. Item: any sabotage will be done on the spur of the moment, provided it isn't already built into the ship."

"Too late to worry about anything built into the ship."

"Just the same, if I were you, I would go over her with a toothpick. Any last minute stuff will be done with a wrench, behind a control panel or such — what they used to call 'target of opportunity."

"Hard to stop."

"Not too hard. There isn't anything that can be done to that ship down at its base, right? Well, if my neck depended on that heap, I wouldn't let anybody up inside it from now on, except those going along. Not *anybody*, not even if he carried a certificate of Simon-pure

one-hundred-percentism from the D.A.R. I'd watch what went in and I'd stow things with my own little pattypaws."

Barnes chewed his lip. "You're right. Herb — you just bought yourself a job."

"Such as?"

"Take over here." He explained what he bad been doing. "As for the press, don't tip them off until you have to make arrangements for the road blocks and evacuation — maybe you can keep things wrapped up until around midnight. I'm going up into that ship and —"

The telephone jangled; he picked it up. "Yes?" It was Bowles.

"Jim — come to the electronics shop."

"Trouble?"

"Plenty. Ward has run out on us."

"Oh, oh! I'll be right over." He slammed the phone and said, "Take over, Herb!"

"Wilco!"

-

Outside, he jumped in his car and swung around the circle to the electronics shops. He found Bowles and Corley in Ward's office. With them was Emmanuel Traub, Ward's first assistant. "What happened?"

Corley answered, "Ward is in the hospital — acute appendicitis."

Bowles snorted. "Acute funk!"

"That's not fair! Ward wouldn't run out on me."

Barnes cut in. "It doesn't matter either way. The question is: what do we do now?"

Corley looked sick. "We can't take off."

"Stow that!" Barnes turned to Bowles. "Red, can you handle the electronics?"

"Hardly! I can turn the knobs on an ordinary two-way — but that ship is *all* electronics."

"I'm in the same fix — Doc, you could. Or couldn't you?"

"Uh, maybe — but I can't handle radar and power plant both."

"You could teach me to handle power plant and Red could pilot."

"*Huh*? I can't make a nucleonics technician out of you in something like a matter of hours."

Barnes seemed to feel the world pressing in on him. He shook off the feeling and turned to Traub. "Mannie, you installed a lot of the electronic gear, didn't you?"

"Me? I installed all of it; Mr. Ward didn't like to go up the Gantry crane. He is a nervous type guy."

Barnes looked at Corley. "Well?"

Corley fidgeted. "I don't know."

Bowles said suddenly, "Traub, where did you go to college?"

Traub looked hurt. "I got no fancy degree but I carry a civil service classification of senior electronics engineer — a P-5. I did three years in the Raytheon labs. I had my ham license since I was fifteen, and I was a master sergeant in the Signal Corps. If it makes with electrons, I savvy it."

Barnes said mildly, "The Admiral didn't mean any harm, Mannie. What do you weigh?"

Traub shifted his eyes from one to the other. "Mr. Barnes — this is no rehearsal? This is it?"

"This is it, Mannie. We take off —" He glanced at his watch. "— in thirteen hours."

Traub was breathing hard. "You gentlemen are asking me to go to the Moon with you? Tonight?"

Before Barnes could answer, Bowles put in: "That's it, Mannie."

Traub swallowed hard. "Yes," he said.

"Yes?" Barnes echoed.

"I'll go."

Corley said hastily, "Traub, we don't want to rush you."

"Director, take a look at my job application. I put down 'Willing to travel'."

## Chapter Three

The great ship was ringed with floodlights spaced inside the bull pen. It was still framed by the skeleton arch of the Gantry crane, but the temporary anti-radiation shield which had surrounded its lower part down to the jets was gone; instead there were posted the trefoil signs used to warn of radioactivity — although the level of radiation had not yet become dangerously high.

But the power pile was unsealed and the ship was ready to go. Thirteen-fifteenths of its mass was water, ready to be flashed into incandescent steam by the atomic pile, to be thrown away at thirty thousand feet per second.

High up in the ship was the control room and adjacent airlock. Below the air lock the permanent anti-radiation shield ran across the ship, separating the pressurized crew space from the tanks, the pumps, the pile itself, and auxiliary machinery. Above the control room, the nose of the craft was unpressurized cargo space.

At its base triangular airfoils spread out like oversize fins — fins they would be as the ship blasted away; glider wings they would become when the ship returned to Earth with her tanks empty.

Jim Barnes was at the foot of the Gantry crane, giving last-minute orders. A telephone had been strung out to the crane; it rang and he turned to answer it.

"Mr. Barnes?"

"Yes, Herb."

"Sheriff's office reports road blocks in place and everybody out of the valley — it cost plenty cumshaw to clear the Idle Hour Guest Rancho, by the way."

"No matter."

"Everybody out, that is, but Pete the Hermit. He won't git."

"The old boy with the whiskers in that shack north of the gate?"

"The same. We finally told him the score, but it didn't faze him. He says he ain't never seen no ship take off for the Moon and he ain't planning to miss it, not at his age."

Barnes chuckled. "Can't blame him. Well, let him sign the release our own people sign. Tell him if he won't sign, the show won't take place."

"And if he doesn't sign?"

"Herb, I take off even if some damn fool is standing under the jets. But don't tell him."

"I got you. Now how about the press?"

"Tell them now — but keep them off my neck. And even with releases they stay in the blockhouse."

"I'll have trouble with the newsreel and television people."

"Remote control or nothing. Herd 'em in, you go in last and lock

the door behind you. They can string all the wires into the blockhouse they need, but nobody stays inside the area unsheltered."

"Mr. Barnes — do you really think the blast will be that dangerous?"

Barnes' reply was drowned out by the bull horn from the blockhouse: "Attention! The last bus is now loading at the north entrance to the shop circle!"

Presently Styles resumed: "Another call — you better take it, boss. Trouble."

"Who is it?"

"Commanding general at Muroc."

"Put him on." In a moment he was saying, "Jim Barnes, General. How are you?"

"Oh — hello, Mr. Barnes. I hate to buck you, but your man seems unreasonable. Is it necessary to ask us to keep radar crews up all night for your practice drill?"

"Mmm . . . General, isn't your tracking radar always manned anyhow? I thought this country had a 'radar umbrella' over it."

The general answered stiffly, "That's not a proper question, Mr. Barnes."

"I suppose not. Big difference between passing a law and getting appropriations to carry it out, isn't there?" He thought a minute. "General, suppose I guarantee blips on your tracking screens?"

"What do you mean?"

Barnes said, "General, I've known you since open cockpits. You've used a lot of my planes."

"You make good planes, Mr. Barnes."

"Tonight I want some cooperation. This is it, Whitey."

"*Huh*?"

"We blast off tonight. As long as you know, you can call White Sands and make sure they track us, too. And Whitey —"

"Yes, Jim?"

"What with getting your crew organized and calling White Sands it will be another hour before you can call Washington, wouldn't you think?"

Silence persisted so long that Barnes thought he had been cut off, then the general answered, "It might take that long. Anything more you had better tell me?"

"No. . . that's enough. Except one thing; I'm going, Whitey. I'm piloting it."

"Oh. Good luck, Jim."

"Thanks, Whitey."

As Barnes turned away, he saw a plane circling the area, its lights blinking. The elevator creaked behind him; he looked up to see Corley, Bowles, and Traub descending. Corley shouted, "Is that Dr. Hastings?"

"I hope so."

The plane landed and a jeep drove up to it. A few minutes later the jeep swung into the bull pen and up to the crane; Doctor Hastings got out. Corley ran to meet him.

"Doctor Hastings! You have it?"

"Greetings, gentlemen. Yes, indeed." Hastings tapped a bulging pocket.

"Give it to me!"

"Suppose we go into the ship? I'd like to discuss it with you."

"Jump aboard." The two savants mounted the elevator and started up.

Admiral Bowles touched Barnes' sleeve. "Jim — a word with you."

"Shoot."

Bowles indicated Traub with his eyes; Barnes caught the meaning and they moved inside. "Jim," Bowles asked in a whisper, "what do you know about this man Traub?"

"Nothing that you don't. Why?"

"He's foreign born, isn't he? Germany? Poland?"

"Russia, for all I know. Does it matter?"

Bowles frowned. "There's been sabotage, Jim."

"The hell you say! What sort?"

"The earth-departure radar wouldn't function. Traub opened up the front, then called me over."

"What was it?"

"A pencil mark drawn between two leads. It —"

"I get you, a carbon short. Sabotage, all right. Well?"

"My point is, he found it too easily. How would he know right where to find it if he didn't do it himself?"

Barnes thought about it. "If Traub is trying to stop us, all he has to do is to refuse to go. We can't go without him — and he knows it."

"Suppose his object was not just to stop us, but to wreck the ship?"

"And kill himself in the bargain? Be logical, Red."

"Some of those people are fanatics, Jim. Beyond logic."

Barnes considered it. "Forget it, Red."

"But —"

"I said, 'Forget it!' Get on back in that ship and prowl around. Imagine that you are a saboteur, try to think where you would hide a bomb — or what you would wreck."

"Aye, aye, sir!"

"Good. Mannie!"

"Yes, Mr. Barnes." Traub trotted up; Barnes told him to go up and continue checking. The phone at the foot of the crane rang; it was Styles again.

"Boss? Just got a call from the pass gate. The deputy there is hooked by car radio with the deputies at the road blocks —"

"Good. Nice organizing, Herb."

"Not good! The north road black reports a car with a bailiff; he has a federal court order to stop the takeoff. They let him through."

Barnes swore softly. "Call, the pass gate. Tell the deputy there to stop him."

"I did. He won't. He says he can't interfere with federal business."

"That tears it!" Barnes stopped to think. "Tell him to make almighty sure that the man is what he says he is. Tell him that the court order is almost certainly phony-which it is. Tell him to hold the man while he gets in touch with the sheriff's office and has the sheriff phone the judge who is supposed to have issued the described order."

"I'll try," Styles answered, "but suppose the order is kosher, boss? Hadn't I better just put the slug on him and dump him in a closet until the fireworks are over?"

Barnes weighed this. "No — you'd spend your life breaking rocks.

Gain me all the minutes you can — then hightail it for the blockhouse. Is everybody clear?"

"Everybody but the car and driver for Mrs. Corley."

"How about Admiral Bowles' wife?"

"He sent her off earlier — the Admiral doesn't like ships watched out of sight."

"Bless his superstitious heart! Send Mrs. Corley's car into the pen. I'm going to button up around here."

"Roger!"

Barnes turned around to find Corley and Hastings descending. He waited, bursting with impatience. Corley spoke as they reached bottom. "Oh, Jim, I —"

"Never mind! Is everything okay up there?"

"Yes, but —"

"No time! Say good-bye to your wife, Doctor Hastings — good-bye, and thanks! Your plane's waiting."

"Jim," protested Corley, "what's the rush? It's —"

"No time!" A car swung in through the gate of the pen, came toward them. "There's your wife. Say good-bye

and get back here. Move!" Barnes turned away and went to the crane operator. "Barney!"

"Yeah?"

"We're going up now — *for the last time*. As soon as we are off the crane, back it away. — The safety stops are off the tracks?"

"Sure."

"Off entirely, or just moved back?"

"Off entirely. Don't worry; I won't run her off the rails."

"Yes, you will. Run the crane right off the end." "Huh? Mr. Barnes, if I dropped the wheels into the sand, it would take a week to get her back on."

"Check. That's exactly what I want. After you do it, don't stop to explain; just run for the blockhouse."

The operator looked baffled. "Okay — you said it."

Barnes came back to the elevator. Corley and his wife were standing near her car. She was crying.

Barnes shaded his eyes against the floodlights and tried to see the road to the pass gate. The foundry cut off his view. Suddenly headlights gleamed around that building, turned onto the shop circle and came toward the bull pen entrance. Barnes shouted, "Doc! Now! Hurry!"

Corley looked up, then hastily embraced his wife. Barnes shouted, "Come on! Come on!"

Corley waited to hand his wife into the car. Barnes climbed onto the elevator and, as Corley reached it, pulled him aboard. "Barney! UP!"

Cables creaked and groaned; the platform crawled upward. As Mrs. Corley's car approached the gate the other car started in. Both cars stopped, then the strange car bulled on through. It gunned in second toward the crane and slammed to a stop; a man swarmed out.

He ran to the elevator, the platform was thirty feet above his head. He waved and shouted. "Barnes! Come down here!"

Barnes shouted back, "Can't hear you! Too much racket!"

"Stop the elevator! I've got a court order!"

The driver of the car jumped out and ran toward the crane control station. Barnes watched, unable to stop whatever was to come.

Barney reached behind him and grabbed a wrench; the driver stopped short. "Good boy!" Barnes breathed.

The elevator reached the airlock door; Barnes nudged Corley. "In you go!" He followed Corley, turned and lifted the gangway off the lip of the door, shoved it clear with his foot. "Barney! Get going!'"

The crane operator glanced up and shifted his controls. The crane quivered, then very slowly crawled back from the ship, cleared it, and continued.

It backed still farther, lurched out of plumb, and trembled. Its drive motor squealed and stopped. Barney slid out of his saddle and loped away toward the gate.

## Chapter Four

Time checks had been completed with Muroc, with White Sands and with their blockhouse. The control room was quiet save for the sighing of air-replenishing equipment, the low hum of radio circuits, and stray sounds of auxiliary machinery. The clocks at each station read 3:29 — twenty-four minutes to H-hour.

The four were at their stations; two upper bunks were occupied by

pilot and co-pilot; the lowers by power engineer and electronics engineer. Across the lap of each man arched a control console; his arms were supported so that his fingers were free to handle his switches without lifting any part of his body against the terrible weight to come. His head was supported so that he might see his instruments.

Traub lifted his head and peered out one of the two large quartz ports. "It's clouding up. I can't see the Moon."

Barnes answered, "Out where we're going there won't be any clouds."

"No clouds?"

"What do you expect, out in space?"

"Uh, I don't know. I guess I got most of my ideas about space travel from -Buck Rogers. Electronics is my game." "Twenty-three minutes," announced Bowles. "Skipper, what's the name of this bucket?"

"Huh?"

"When you launch a ship you have to name her."

"Eh, I suppose so. Doc, what do you say? She's your baby."

"Me? I've never thought about it."

"How," Bowles went on, "about calling her the *Luna*?"

Corley considered. "Suits me, if it suits the rest of you."

"The space ship Luna," agreed Barnes. "Sounds good."

Traub chuckled nervously. "That makes us 'the Lunatics.'"

"And why not?" agreed Barnes.

"Twenty minutes," announced Bowles.

"Warm her up, Doc. Check-off lists, everybody."

"She's hot now," Corley answered. "If I increase the fission rate, I'll have to give her something to chew. Jim, I've been thinking. We could still test her."

"Huh?"

"Set her for a half-g lift, and clear her throat once I've got her set for that."

"What's the point? She either works, or she blows up."

"Okay," Corley answered.

Traub gulped. "Could she blow up?"

"Don't worry," Cqrley reassured him. "The scale model ran an hour and twenty-three minutes before it blew up."

"Oh. Is that good?"

"Mannie," Barnes ordered. "Switch on 'Ground Pick-Up.' We might as well watch."

"Yes, sir." Above them was a large TV screen. Traub could hook it in to a scanner in the tail, another in the nose, or — as now — pick up an ordinary video channel. The screen lighted up; they saw their own ship, lonely and tall in the floodlights.

An announcer's voice came with the picture: "— this ship, the mightiest ever built, will soon plunge into outer space. Its flight was unannounced until tonight, its destination has not been revealed. Is this —"

The broadcast was interrupted by Herb Styles. "Mr. Barnes! Boss!"

-

Barnes leaned out and looked at Traub in the couch beneath. "Are you hooked in?"

"Just a sec — go ahead."

"What is it, Herb?"

"Somebody tearing down the road, heading this way."

"Who?"

"Don't know. We can't contact the north road block."

"Call the pass gate. Head 'em off."

"It's no longer manned. Hey — wait. North road block coming in." After a pause, Styles yelled, "Truck loaded with men — they crushed through and ran over a deputy!"

"Keep your shirt on," cautioned Barnes. "They can't reach us. If they hang around down below, it's their misfortune. I'm blasting on time."

Bowles sat up. "Don't be too sure, Jim."

"Eh? What can they do to us now?"

"What would six sticks of dynamite against one of the tail jacks do to this ship? Let's take off — now!"

"Before calculated time? Red, don't be silly."

"Blast off and correct later!"

"Doc — could we do that?"

"Eh? *No*!"

Barnes stared at the TV picture. "Mannie — tell blockhouse to sound sirens!"

"Jim," protested Corley, "you can't take off now!"

"Are you still set up to test? Half g?"

"Yes, but —"

"Stand by!" His eyes were fixed on the pictured scene outside; headlights came around the foundry, sped toward the pen. The moaning of sirens drowned out Corley's answer.

The truck was almost at the gate. Barnes' forefinger stabbed the firing button.

A whine of great pumps was blanked out by a roar they could feel in their bones. The Luna shivered.

In the TV screen a flower of white light burst from the tail of the ship, billowed up, blanketing the headlights, the buildings, the lower half of the ship.

Barnes jerked his finger back. The noise died out; the cloud changed from incandescent to opaque. In the silence Styles' voice came over the speaker. "*Great — Day — in the Morning*!"

"Herb — can you hear me?"

"Yes. What happened?"

"Use the bull horn to warn them off. Tell 'em to scram; if they come closer I'll fry them."

"I think you have."

"Get busy." He watched the screen, his finger raised. The cloud lifted; he made out the truck.

"Nine minutes," Bowles announced, calmly.

Through the speaker Barnes could hear a voice on the bull horn, warning the attacking party back. A man jumped down from the truck, was followed by others.

Barnes' finger trembled.

They turned and ran.

Barnes sighed. "Doc, did the test suit you?"

"A mushy cutoff," Corley complained. "It should have been sharp."

"Do we blast, or don't we?"

Corley hesitated. "Well?" demanded Barnes.

"We blast."

Traub heaved a mournful sigh. Barnes snapped, "Power plant — shift to automatic! All hands — prepare for acceleration. Mannie, tell blockhouse, Muroc, and White Sands to stand by for count off at oh three five two."

"Oh three five two," Traub repeated, then went on, "Ship calling blockhouse, Muroc, White Sands."

"Power plant, report."

"Automatic, all green."

"Co-pilot?"

"Tracking on autopilot." Bowles added, "Eight minutes."

"Doc, is she hot as she'll take?"

"I'm carrying the fission rate as high as I dare," Corley answered, strain in his voice. "She's on the ragged edge."

"Keep her so. All hands, strap down."

Corley reared up. "Jim — I forgot to pass out the drop-sick pills."

"Stay where you are! If we get seasick, we get seasick."

"One minute, coming up!" Bowles' voice was harsh.

"Take it, 'Mannie!"

"Blockhouse — Muroc — White Sands. Ready for count off!" Traub paused; the room was still.

"Sixty! Fifty-nine — fifty-eight — fifty-seven —"

Barnes gripped his arm rests, tried to slow down his heart. He watched the- seconds click off as Traub counted them. "Thirty-nine! Thirty-eight! Thirty-seven!" Traub's voice was shrill. "Thirty-one! *Half*!"

Barnes could hear sirens, rising and falling, out on the field. Above him in the TV screen, the *Luna* stood straight and proud, her head in darkness.

"Eleven"

"And ten"

"And nine!"

"And eight!" — Barnes licked his lips and swallowed.

"Five — four — three — two —

"Fire!"

The word was lost in sound, a roar that made the test blast seem as nothing. The Luna shrugged — and climbed for the sky.

## Chapter Five

*If we are to understand those men, we must reorient. Crossing the Atlantic was high adventure — when Columbus did it. So with the early spacemen. The ships they rode in were incredibly makeshift.*

*They did not know what they were doing. Had they known, they would not have gone.*

Farquharson, Ibid., III: 415

Barnes felt himself shoved back into the cushions. He gagged and fought to keep from swallowing his tongue. He felt paralyzed by body weight of more than half a ton; he strained to lift his chest. Worse than weight was noise, a mind-killing "white" sound from unbearable ultrasonics down to bass too low to be heard.

The sound Dopplered down the scale, rumbled off and left them. At five effective gravities they outraced their own din in six seconds, leaving an aching quiet broken only by noise of water coursing through pumps.

For a moment Barnes savored the silence. Then his eyes caught the TV screen above him; in it was a shrinking dot of fire. He realized that he was seeing himself, disappearing into the sky, and regretted that he had not watched the blast-away. "Mannie," he labored, to say, "switch on 'View After.'"

"I *can't*," Traub groaned thickly. "I can't move a muscle."

"Do it!"

Traub managed it; the screen blurred, then formed a picture. Bowies grunted, "Great Caesar's ghost!" Barnes stared. They were high above Los Angeles; the metropolitan area was map sharp, picked out in street lights and neon. It was shrinking visibly.

Rosy light flashed through the eastern port, followed at once by dazzling sunlight. Traub yelped, "*What happened?"*

Barnes himself had been startled but he strove to control his voice and answered, "Sunrise. We're up that high." He went on, "Doc — how's the power plant?"

"Readings normal," Corley replied in tongue-clogged tones. "How long to go?"

Barnes looked at his board. "More than three minutes."

Corley did not answer, three minutes seemed too long to bear. Presently Traub said, "Look at the sky!" Corley forced his head over and looked. Despite harsh sunlight the sky was black and spangled with stars.

At three minutes and fifty seconds the jets cut off. Like the first time, the cutoff was mushy, slow. The terrible weight left them gradually. But it left them completely. Rocket and crew were all in a free orbit "falling" upward toward the Moon. Relative to each other and to ship they had no weight.

Barnes felt that retching, frightening "falling elevator" feeling characteristic of no weight, but, expecting it, he steeled himself. "Power, plant," he snapped, "report!"

"Power plant okay," Corley replied weakly. "Notice the cutoff?"

"Later," decided Barnes. "Co-pilot, my track seems high."

"My display tracks on," wheezed Bowles, "— or a hair high."

"Mannie!"

No answer. Barnes repeated, "Mannie? Answer, man — are you all right?"

Traub's voice was weak. "I think I'm dying. This thing is falling — oh, God, *make it stop*!"

"Snap out of it!"

"Are we going to crash?"

"No, no! We're all right."

"All right,' the man says, Traub muttered, then added, "I don't care if we do."

Barnes called out, "Doc, get those pills. Mannie needs one bad." He stopped to control a retch. "I could use one myself."

"Me, too," agreed Bowles. "I haven't been this seasick since I was —" He caught himself, then went on. "— since I was a midshipman."

Corley loosened his straps and pulled himself out from his couch. Weightless, he floated free and turned slowly over, like a diver in slow motion. Traub turned his face away and groaned.

"Stop it, Mannie," ordered Barnes. "Try to raise White Sands. I want a series of time-altitude readings."

"I can't — I'm sick."

*"Do it!"*

Corley floated near a stanchion, grabbed it, and pulled himself to a cupboard. He located the pill bottle and hastily gulped a pill. He then moved to Traub's couch, pulling himself along. "Here, Traub — take this. You'll feel better."

"What is it?"

"Some stuff called Dramamine. It's for seasickness."

Traub put a pill in his mouth. "I can't swallow."

"Better try." Traub got it down, clamped his jaw to keep it down. Corley pulled himself to Barnes. "Need one, Jim?"

Barnes started to answer, turned his head away, and threw up in his handkerchief. Tears streaming from his eyes, he accepted the pill. Bowles called out, "Doc — hurry up!" His voice cut off; presently he added, "Too late."

"Sorry." Corley moved over to Bowles. "Criminy, you're a mess!"

"Gimme that pill and no comments."

Traub was saying in a steadier voice, "Spaceship *Luna*, calling White Sands. Come in White Sands."

At last an answer came back, "White Sands to Spaceship — go ahead."

"Give us a series of radar checks, time, distance, and bearing."

A new voice cut in, "White Sands to Spaceship — we have been tracking you, but the figures are not reasonable. What is your destination?"

Traub glanced at Barnes, then answered, "Luna, to White Sands — destination: Moon."

"Repeat? Repeat?"

"Our destination is the Moon!"

There was a silence. The same voice replied, "Destination: Moon — Good luck, Spaceship *Luna*!"

-

Bowles spoke up suddenly. "Hey! *Come look*!" He had unstrapped and was floating by the sunward port.

"Later," Barnes answered. "I need this tracking report first."

"Well, come look until they call back. This is once in a lifetime."

Corley joined Bowles. Barnes hesitated; he wanted very badly to see, but he was ashamed to leave Traub working. "Wait," he called

out. "I'll turn ship and we can all see."

Mounted at the centerline of the ship was a flywheel. Barnes studied his orientation readings, then clutched the ship to the flywheel. Slowly the ship turned, without affecting its motion along its course. "How's that?"

"Wrong way!"

"Sorry." Barnes tried again; the stars marched past in the opposite direction; Earth swung into view. He caught sight of it and almost forgot to check the swing.

Power had cut off a trifle more than eight hundred miles up. The *Luna* had gone free at seven miles per second; in the last few minutes they had been steadily coasting upwards and were now three thousand miles above Southern California. Below — opposite them, from their viewpoint — was darkness. The seaboard cities stretched across the port like Christmas lights. East of them, sunrise cut across the Grand Canyon and shone on Lake Mead. Further east the prairies were in daylight, dun and green broken by blinding cloud. The plains dropped away into curved skyline.

So fast were they rising that the picture was moving, shrinking, and the globe drew into itself as a ball. Barnes watched from across the compartment. "Can you see all right, Mannie?" he asked.

"Yeah,", answered Traub. "Yeah," he repeated softly. "Say, that's *real*, isn't it?"

Barnes said, "Hey, Red, Doc — heads down. You're not transparent."

Traub looked at Barnes. "Go ahead, skipper."

"No, I'll stick with you."

"Don't be a chump. I'll look later."

"Well —" Barnes grinned suddenly. "Thanks, Mannie." He gave a shove and moved across to the port.

Mannie continued to stare. Later the radio claimed his attention. "White Sands, calling Spaceship — ready with radar report."

The first reports, plus a further series continued as long as White Sands and Muroc were able to track them, confirmed Barnes' suspicion. They were tracking "high," ahead of their predicted positions and at speeds greater than those called for by Hastings' finicky calculations. The difference was small; on the autopilot displays it was hardly the thickness of a line between the calculated path and the true path.

But the difference would increase.

"Escape speeds" for rockets are very critical Hastings had calculated the classical hundred-hour orbit and the *Luna* had been aimed to reach the place *where the Moon would be* four days later. But initial speed is critical. A difference of less than one percent in ship speed at cutoff can halve — or double — the transit time from Earth to Moon. The *Luna* was running very slightly ahead of schedule — but when it reached the orbit of the Moon, the Moon would not be there.

Doctor Corley tugged at his thinning hair. "Sure, the cutoff was mushy, but I was expecting it and I noted the mass readings. It's not enough to account for the boost. Here — take a look."

Corley was hunched at the log desk, a little shelf built into the space between the acceleration bunks. He was strapped to a stool fixed to the deck in front of it. Barnes floated at his shoulder; he took the calculation and scanned it. "I don't follow you," Barnes said presently; "your expended mass is considerably higher than Hastings calculated."

"You're looking at the wrong figure," Corley pointed out. "You forgot the mass of water you used up in that test. Subtract that from the total mass expended to get the effective figure for blast off — this figure here. Then you apply that —" Corley hesitated, his expression changed from annoyance to dismay. "Oh, my God!"

"Huh? What is it, Doc? Found the mistake?"

"Oh, how could I be so stupid!" Corley started frenzied figuring.

"What have you found?" Corley did not answer; Barnes grabbed his arm. "What's up?"

"Huh? Don't bother me."

"I'll bother you with a baseball bat. *What have you found*?"

"Eh? Look, Jim, what's the final speed of a rocket, ideal case?"

"What is this? A quiz show? Jet speed times the logarithm of the mass ratio. Pay me."

"And *you* changed the mass ratio! No wonder we're running 'high."

"Me?"

"We both did — my fault as much as yours. Listen; you spilled a mass of water in scaring off that truckload of thugs — but Hastings' figures were based on us lifting that particular mass *0*. The ship should have grossed almost exactly two hundred fifty tons at takeoff; she was shy what you had used — so we're going too fast."

"Huh? I wasted reaction mass, so we're going too fast? That doesn't make sense." Barnes hooked a foot into the legs of the stool to anchor himself, and did a rough run-through of the problem with slide rule and logarithm table. "Well, boil me in a bucket!" He added humbly, "Doc, I shouldn't have asked to be skipper. I don't know enough."

Corley's worried features softened. "Don't feel that way, Jim. Nobody knows enough — yet. God knows I've put in enough time on theory, but I went ahead and urged you to make the blunder."

"Doe, how important is this? The error is less than one percent. I'd guess that we would reach the Moon about an hour early."

"And roughly you'd be wrong. Initial speed is critical, Jim; you know that!"

"How critical? When do we reach the Moon?"

-

Corley looked glumly at the pitiful tools he had with him — a twenty-inch log-log slide rule, seven place tables, a Nautical Almanac, and an office-type calculator which bore the relation to a "giant brain" that a firecracker does to an A-bomb. "I don't know. I'll have to put it up to Hastings." He threw his pencil at the desk top; it bounced off and floated away. "The question is: do we get there at all?"

"Oh, it can't be that bad!"

"It is that bad."

From across the compartment Bowles called out, "Come and get it — or I throw it to the pigs!"

But food had to wait while Corley composed a message to Hastings. It was starkly simple: OFF TRAJECTORY. USE DATA WHITE SANDS MUROC AND COMPUTE CORRECTION VECTOR. PLEASE USE UTMOST HASTE — CORLEY.

After sending it Traub announced that he wasn't hungry and didn't guess he would eat.

Bowles left the "galley" (one lonely hot plate) and moved to Traub's couch. Traub had strapped himself into it to have stability while he handled his radio controls. "Snap out of it, man," Bowles advised. "Must eat, you know."

Traub looked gray. "Thanks, Admiral, but I couldn't."

"So you don't like my cooking? By the way, my friends call me 'Red.'"

"Thanks, uh — Red. No, I'm just not hungry."

Bowles brought his head closer and spoke in low tones. "Don't let it get you, Mannie. I've been in worse jams and come out alive. Quit worrying."

"I'm not worrying."

Bowles chuckled. "Don't be ashamed of it, son. We all get upset, first time under fire. Come eat."

"I can't eat. And I've *been* under fire."

"Really?"

"Yes, really! I've got two Purple Hearts to prove it. Admiral, leave me alone, please. My stomach is awful uneasy."

Bowles said, "I beg your pardon, Mannie." He added, "Maybe you need another seasick pill."

"Could be."

"I'll fetch one." Bowles did so, then returned again shortly with a transparent sack filled with milk — to be exact, a flexible plastic nursing cell, complete with nipple. "Sweet milk, Mannie. Maybe it'll comfort your stomach."

Traub looked at it curiously. "With this should go a diaper and a rattle," he announced. "Thanks, uh — Red."

"Not at all, Mannie. If that stays down, I'll fix you a sandwich." He turned in the air and rejoined the others.

## Chapter Six

The Luna plunged on; Earth dropped away; radio signals grew weaker — and still no word from Hastings. Corley spent the time trying endlessly and tediously to anticipate the answer he expected from Hastings, using the tools be had. Traub stood guard at the radio. Barnes and Bowles spent a lengthy time staring out the ports — back at the shrinking, cloud-striped Earth, forward at the growing gibbous Moon and brilliant steady stars — until Bowles fell asleep in mid-sentence, a softly snoring free balloon.

Barnes nudged him gently toward his couch and there strapped him loosely, to keep him from cluttering up the cramped cabin. He eyed his own couch longingly, then turned to Traub instead.

"Out of there, Mannie," he ordered. "I'll relieve you while you catch some shut-eye."

"Me? Oh, that's all right, Skipper. You get some sleep yourself and I'll take a rain check."

Barnes hesitated. "Sure you don't want to be relieved?"

"Not a bit. I feel —" He broke off and added, "Just a minute," and turned to his controls. He was on earphones now, rather than speaker. He settled them in place and said sharply, "Go ahead, Earth."

Presently Traub turned to Barnes: "Chicago Tribune — they want an exclusive story from you."

"No, I'm going to sleep."

Traub reported Barnes' answer, then turned back. "How about the Admiral or Doctor Corley?"

"The co-pilot is asleep and Doctor Corley is not to be disturbed."

"Mr. Barnes?" Traub's manner was diffident. "Do you mind if they get one from *me*?"

Barnes chuckled. "Not at all. But stick them plenty." As Barnes closed his eyes he could hear Traub dickering with some faceless negotiator. He wondered if Traub would ever get to spend the fee? What was a man like Traub doing up here anyhow, in a ship headed nowhere in a hell of a hurry?

For that matter, why was Jim Barnes here?

After his interview, Traub continued guarding the radio. Signals grew fainter and presently reduced to garble. The room was quiet, save for the soft murmur of the air replenisher.

-

After a long time the radio came suddenly to life — NAA, Washington, Traub soon learned, had rigged a reflector to beam directly at them. "Can you take code groups?" he was asked.

He assured them that he could. "Despatch for Rear Admiral Bowles," NAA rapped back at him. "Zero zero zero one: code groups follow — love, uncle, king, easy, roger — boy, able, dog, item, peter —" The groups continued for a longtime.

"Doctor Corley!"

Corley looked around vaguely, as if awakening in a strange place. "Eh? Yes, Mannie? I'm busy."

"Doctor Hastings calling."

"Oh, fine," Corley acknowledged. "Slide out of there and let me take it."

They changed places with effort, bothered by weightlessness. Traub felt a touch on his arm. "What is it, Mannie?"

He turned; Barnes and Bowles had waked up and loosed themselves. "Howdy, Skipper. It's Doctor Hastings."

"Good!"

"Uh, Admiral — got something for you." Traub hauled out the code dispatch.

Bowles stared at it. Barnes remarked, "Race results?"

Bowles did not answer. He shoved himself toward the forward bulkhead, as far away as possible. He then took a thin book from an inner pocket, and started studying the message with the aid of the book. Barnes looked surprised but said nothing.

Hastings' report was short but not sweet. They would reach the Moon's orbit where planned, but more than fifty hours too soon — and would miss the Moon by more than 90,000 miles!

Barnes whistled. "Hot pilot Barnes, they call me."

Corley said, "It's no joke."

"I wasn't laughing, Doc," Barnes answered, "but there is no use crying. It will be tragic soon enough."

Traub broke in. "Hey — what do you mean?"

"He means," Bowles said bluntly, "that we are headed out and aren't coming back."

"On out? And out — out into outer space? Where the stars are?"

"That's about it."

"Not that," Corley interrupted, "I'd estimate that we would reach our farthest point somewhere around the orbit of Mars."

Traub sighed. "So it's Mars, now? That's not so bad, is it? I mean — they say people live on Mars, don't they? All those canals and things? We can get another load of water and come back."

"Don't kid yourself, Mannie," Bowles said. "Just be glad you're a bachelor."

"A bachelor? Who said I was?"

"Aren't you?"

"Me? I'm a very domestic type guy. Four kids — and married--

fourteen years."

Corley looked stricken. "Mannie, I didn't know."

"What's that got to do with it? Insurance I've got, with a rocket

experimentation rider. I knew this was no picnic."

Barnes said, "Mannie, if I had known, I wouldn't have asked you to go. I'm sorry." He turned to Corley, "When do we run out of water — and air?"

Corley raised his voice. "Please! Everybody! I -didn't say we weren't going to get back. I said —"

"But you —"

"Shut up, Red! I said this orbit is no good. We've got to vector west, toward the Moon. And we've got to do it at —" He glanced at a clock. "Good grief! Seven minutes from now."

Barnes jerked his head around. "Acceleration stations, everybody! Stand by to maneuver!"

## Chapter Seven

*The most treacherous maneuver known to space flight is a jet landing on an airless planet. Even today, it commands the highest pay, the most skilled pilots —*

Farquharson, Ibid., III: 418

For forty hours they fell toward the Moon. The maneuver had worked; one could see, even with naked eye, that they were closing with the Moon. The four took turns at the radio, ate and slept and talked and stared out at the glittering sky. Bowles and Traub discovered a common passion for chess and played off the "First Annual Interplanetary Championship" — so dubbed by the Admiral

— using pencil marks on paper. Traub won, four out of seven.

Some two hundred thousand miles out the *Luna* slid past the null point between Earth and Moon, and began to shape her final orbit. It became evident that the correction vector had somewhat overcompensated and that they were swinging toward the Moon's western limb — "western" as seen from Earth: the *Luna's* orbit would intersect her namesake somewhere on the never-yet-seen far side — or it was possible that the ship would skim the far side at high speed, come around sharply and head back toward Earth.

Two principal styles of landing were possible — Type A, in which a ship heads in vertically, braking on her jets to a landing in one maneuver, and Type B, in which a ship is first slowed to a circular orbit, then stopped dead, then backed to a landing when she drops from the point of rest.

"Type A, Jim — it's simplest."

Barnes shook his head. "No, Doc. Simple on paper only. Too risky." If they corrected course to head straight in (Type A), their speed at instant of braking would be a mile and a half a second and an error of one second would land them 8000 feet above — or below! — the surface.

Barnes went on, "How about a modified 'A'?" Modified Type A called for intentionally blasting too soon, then cutting the jets when the radar track showed that the ship hovered, allowing it to fall from rest, then blasting again as necessary, perhaps two or three times.

"Confound it, Jim, a modified 'A' is so damned wasteful."

"I'd like to get us down without wrecking us."

"And I would like us to get home, too. This ship was figured for a total change of twelve and a half miles per second. Our margin is paper thin."

"Just the same, I'd like to set the autopilot to kick her a couple of seconds early."

"We can't afford it and that's that."

"Land her yourself, then. I'm not Superman."

"Now, Jim —"

"Sorry." Barnes looked at the calculations. "But why Type A? Why not Type B?"

"But Jim, Type B is probably ruled out. It calls for decelerating at point of closest approach and, as things stand now, 'closest approach' may be contact."

"Crash, you mean. But don't be so damned conventional; you can vector into a circular orbit from any position."

"But that wastes reaction mass, too."

"Crashing from a sloppy Type A wastes more than reaction mass," Barnes retorted. "Get to work on a 'B'; I won't risk an 'A."

Corley looked stubborn. Barnes went on, "There's a bonus with Type B, Doc — two bonuses."

"Don't be silly. Done perfectly, it takes as much reaction mass as Type A; done sloppily, it takes more."

"I won't be sloppy. Here's your bonus: Type A lands us on this face, but Type B lets us swing around the Moon and *photograph the back side* before we land. How does that appeal to your scientific soul?"

Corley looked tempted. "I thought about that, but we've got too little margin. It takes a mile and a half of motion to get down to the Moon, the same to get up — three miles. For the trip back I have to save enough mass to slow from seven miles a second to five before we dip into the atmosphere. We used up seven to blast off — it all adds up to twelve. Look at the figures; what's left?"

Barnes did so and shrugged. "Looks like a slightly fat zero."

"A few seconds of margin at most. You could waste it on the transitions in a Type B landing."

"Now the second bonus, Doe," Barnes said slowly. "The Type B gives you a chance to change your mind after you get into a circular orbit; the straight-in job commits you beyond any help."

Corley looked shocked. "Jim, you mean go back to Earth *without landing*?"

Barnes lowered his voice. "Wait, Doc. I'd land on the Moon if I had enough in tanks to get down — and not worry about getting up again. I'm a bachelor. But there's Mannie Traub. No getting around it; we stampeded him. Now it turns out he has a slew of kids, waiting for poppa to come home. It makes a difference."

Corley pulled at his scalp lock. "He should have told us."

"If he had, we wouldn't have taken off."

"Confound it, things would have been all right if I hadn't suggested that you test the engine."

"Nonsense! If I hadn't scared those babies off with a blast, they probably would have wrecked the ship."

"You can't be sure."

"A man can't be sure of anything. How about Traub?"

"You're right — I, suppose. Okay, we leave it up to Traub."

From the other end of the compartment Traub looked around from his chess game with Bowles.

"Somebody call me?"

"Yes," Barnes agreed. "Both of you. We've got things to decide."

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Barnes outlined the situation. "Now," he said, "Doc and I agree that, after we get into a circular orbit and have had time to add up what's left, Mannie should decide whether we land, or just swing around and blast for home."

Bowles looked amazed, but said nothing.

Traub looked flustered. "Me? It ain't my business to decide. I'm the electronics department."

"Because," Barnes stated, "you're the only one with kids."

"Yes, but — Look here — is there really a chance that, if we landed, we wouldn't be able to get back?"

"Possible," Barnes answered and Corley nodded.

"But don't you know?"

"Look, Mannie," Barnes countered, "we've got water in the tanks to land, take off, and return to Earth — but none for mistakes."

"Yes, but you won't make any mistakes, will you?"

"I can't promise. I've already made one and it's brought us to this situation."

-

Traub's features worked in agonized indecision. "But it's not my business to decide!"

Bowles spoke up suddenly. "You're right; it's not!" He went on, "Gentlemen, I didn't intend to speak, because it never crossed my mind that we might not land. But now the situation demands it. As you know, I received a coded message.

"The gist was this; our trip has caused grave international repercussions. The Security Council has been in constant session, with the U.S.S.R. demanding that the Moon be declared joint property of the United Nations —"

"As it should be," Corley interrupted.

"You don't see the point, Doctor. Their only purpose is to forestall us claiming the Moon — we, who actually are making the trip. To forestall us, you understand, so that the United States will not be able to found a base on the Moon without permission — permission that is certain to be vetoed."

"But," pointed out Corley, "it works both ways. We would veto Russia establishing a base on the Moon. Admiral, I've worked with you because it was a way to get on with my life's ambition, but, to be frank, using the Moon as a rocket launching base — *by anybody* — sticks in my craw."

Bowles turned red. "Doctor, this is not an attempt to insure the neutrality of the Moon; this is the same double-talk they used to stop world control of atomics. The commissars simply want to tie us up in

legalisms until they have time to get to the Moon. We'll wake up one morning to find Russia with a base on the Moon and us with none — and World War Three will be over before it starts."

"But — Admiral, you can't know that."

Bowles turned to Barnes. "Tell him, Jim."

Barnes gestured impatiently. "Come out of your ivory tower, Doc. Space travel is here now — we did it. There is bound to be a rocket base on the Moon. Sure, it ought to be a United Nations base, keeping the peace of the world. But the, United Nations has been helpless from scratch. The first base is going to belong to us — or to Russia. Which one-do you trust not to misuse the power? Us — or the Politburo?"

Corley covered his eyes, then looked at Bowles. "All right," he said dully. "It has to be — but I don't like it."

Traub broke the ensuing silence with "Uh, I don't see how this ties in with whether we land or not?"

Bowles turned to him. "Because of this: the rest of that message restored me to active duty and directed me to claim the Moon in the name of the United States — as quickly as possible. We would have what the diplomats call a *fait accompli*. But to claim the Moon *I have to land*!"

Traub stared. "Oh. I see."Bowles went on in a gentle voice, "Mannie, this goes beyond you and me, or even your kids. The surest way to make sure that your kids grow up in a peaceful, free world is to risk your neck right now. So we've got to land."

Traub hesitated; Bowles went on, "You see that, don't you? It's for your kids — and millions of other kids."

Barnes interrupted him. "Red — quit working on him!"

"Eh?"

"He'll make a free choice — after we've leveled off and looked the situation over."

"But, Jim, I thought we saw eye to eye. You told Doc —"

"Pipe down! You've stated your case, now quit trying to work him up into being a martyr."

Bowles turned bright red. "I must inform you, sir, that besides being returned to active duty I was given authority to commandeer this ship."

Barnes locked eyes with him. "You can take your authority and — do whatever you think proper with it. I'm skipper and will stay so as

long as I'm alive." He looked around. "All hands — get ready for approach. Doe, go ahead with trial calculations, Type B. Mannie, warm up the pilot radar. Bowles!"

Finally Bowles answered, "Yes, sir."

"Rig the autocamera in the starboard port. We'll take a continuous strip as we pass around the far side."

"Aye aye, sir."

-

Traub leaned from his couch and peered out the starboard port. "It's just like the other side."

Barnes answered, "What did you expect? Skyscrapers? Co-pilot, how do you track?"

"Speed over ground — one point three seven. Altitude, fifty-one point two, closing slowly."

"Check. I project closest approach at not less than twenty-one — no contact. What do you get?"

"Closer to twenty, but no contact."

"Check. Take over orientation. I'll blast when altitude changes from steady to opening."

"Aye aye, sir!"

The *Luna* was swinging around the unknown far face of the Moon, but her crew was too busy to see much of the craggy, devil-torn landscape. She was nearing her closest approach, travelling almost horizontally. She was pointed tail first, ready to blast back from a top speed of a mile and a half a second to a circular orbit speed of a mile a second. At Barnes' order Bowles gave his attention to placing her axis precisely horizontal.

The television screen read "View Aft"; in its center was a cross mark lying over a picture of the mountainous horizon they were approaching. He jockeyed the ship against the reaction of the flywheel, then steadied her by gyros when one cross line held steady on the horizon.

Barnes set his controls on semiautomatic, ready both to fire and cut off with one punch of the firing button. Into his autopilot he fed the speed change he wished to achieve. Altitude dropped to forty miles, to thirty, to less than twenty-five. "Power plant," Barnes called out, "stand by for blasting!"

"Ready, Jim," Corley reported quietly.

"Electronics?"

"Everything sweet, Skipper."

Barnes watched ground speed with one eye, the radar altimeter with the other. . . twenty-three, it said... twenty-two. . . twenty-one and a half.

Twenty-one point five . . . twenty-one - point four — point four again — and again. Point five! and crawling up. His finger stabbed at the firing button.

The blast was fourteen seconds only, then it cut off, but in the same mushy fashion which it had before. Barnes shook his head to clear it and looked at his board. Altitude twenty-one point five; ground speed, one plus a frog's whisker — they were in orbit as planned. He sighed happily. "That's all for now, troops. Leave everything hot but you can get out of your hammocks."

Bowles said, "Hadn't I better stay and watch the board?"

"Suit yourself — but they won't repeal the law of gravitation. Doc, let's see how much juice we have left." He glanced at a clock. "We've got an hour to make a decision. It will be almost half an hour before Earth is in sight again."

"I don't like the way she cuts off," Corley complained.

"Quit fretting. I used to have a car that sounded its horn every time I made a left turn."

-

Bowles got a container of coffee, then joined Traub at the starboard port. They peered around the automatic camera and watched the moonscape slide past. "Rugged terrain," Bowles remarked.

Traub agreed. "There's better stuff going to waste in California."

They continued to stare out. Presently Bowles turned in the air and slithered back to his acceleration couch.

"Traub!"

Mannie came to the desk. "Mannie," Barnes said, pointing at a lunar map, "we figure to land spang in the middle of the Earthside face — that dark spot, *Sinus Medii*. It's a plain."

"You figure to land, then?"

"It's up to you, Mannie. But you'll have to make up your mind. We'll be there in about — uh, forty minutes."

Traub looked troubled. "Look,chief, you shouldn't —"

He was interrupted by Bowles' voice. "Captain! We are closing, slowly."

"*Are you sure*?"

"Quite sure. Altitude nineteen point three — correction: point two. . . closing."

"*Acceleration stations*!"

Barnes was diving toward his couch as he shouted.

Traub and Corley followed him. As he strapped down

Barnes called out, "Co-pilot — get a contact prediction.

All hands, stand by for maneuvers." He studied his own board. He could not doubt it; they were in something less than a perfect circle.

He was trying to make a prediction from his display when Bowles reported, "I make it contact in nine minutes, Captain, plus or minus a minute."

Barnes concentrated. The radar track was jiggling as much as five or ten percent, because of mountains below them; the prediction line was a broad band. As near as he could tell, Bowles was right.

"What now, Captain?" Bowles went on. "Shall I swing her to blast forward?" A slight nudge would speed up the ship, in effect, lift her, permit her to *fall around* the Moon rather than curve down.

It would also waste reaction mass.

Nine minutes. . . nine hundred miles, about. He tried to figure how many minutes it would be until they raised Earth over the horizon, ahead.

Seven minutes, possibly — and Earth would be in sight. A landing at *Sinus Medii* was impossible but they still might land in sight of Earth without using more precious water to correct their orbit. "Mannie," he snapped, "we land in seven minutes — or we never land. *Make up your mind*!"

Traub did not answer.

Barnes waited, while a minute coursed by. Finally he said in a weary voice, "Co-pilot — swing to blast forward. All hands, prepare for departure."

Traub suddenly spoke up. "That's what we came for, wasn't it? To land on the Moon? Well, let's land the damn thing!"

Barnes caught his breath. "Good boy! Co-pilot, cancel that last. Steady ship for deceleration. Sing out when you see Earth."

"Aye aye, sir!"

"There's Earth!"

Barnes glanced up, saw, Terra pictured in the TV screen, rising behind a wall of mountains. Bowles went on, "Better land, Jim. You'll never get over those mountains."

Barnes did not argue; their altitude was barely three miles now. He shouted, "Stand by. Red, start swinging as soon as I cut off."

"Right!"

"Fire!" He stabbed the button. This maneuver was manual, intended only to stop their forward motion. He watched his ground-speed radar while the ship shivered — nine-tenths . . . seven . . . -five . . . four.;. three.. . two. . one . . . six-hundredths. He jerked his finger off just before it dropped to zero and prayed that a mushy cutoff would equal his anticipation.

He started to shout to Bowles, but the ship was already swinging.

Earth and the horizon swung up in the TV screen and out of sight.

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For a crawling ten seconds, while they fell straight down, the *Luna* crept into position for a tail-first landing. They were less than three miles up now. Barnes shifted scale from miles to feet and started his prediction.

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Bowles beat him to an answer. "Contact in seventy-two seconds, Skipper."

Barnes relaxed. "See the advantage of a Type 'B' landing, Doc," he remarked cheerfully. "No hurry — just like an elevator."

"Quit gabbing and get us down," Corley answered taut1y.

"Right," Barnes agreed. "Co-pilot, predict the blast altitude." His own hands were busy to the same end.

Bowles answered, "Jim, you going manual or automatic?"

"Don't know yet." Automatic firing was quicker, possibly more certain — but that mushy cutoff could bounce them like a ping-pong ball. He steadied crosshairs on his autopilot display and read the answer: "Blast at five two oh feet. What do you get, Red?"

"Check." Bowles added, "That's less than three seconds blast, Jim. Better make it automatic."

"Tend to your knitting."

"My mistake."

Nearly forty seconds passed and they had fallen to eleven thousand feet before he decided. "Power plant, set for manual landing. Co-pilot, cover me at five hundred feet."

"Jim, that's too late," Bowles protested.

"You will be covering me all of a tenth of a second — after I should fire."

Bowles subsided. Barnes grabbed a glance at the TV screen; the ground under them seemed level and there was no perceptible drift. He looked back at his board. "Correction — cover at five ten."

"Five ten — right."

The seconds clicked past; he had his finger poised over the button when Bowles shouted, "Jim — look at the screen!"

He looked up — the *Luna*, still carrying a trifle of drift, was now over a long crack, or rill — and they were about to land in it.

Barnes jabbed the button.

He let up at once; the Luna coughed to silence. The rill, canyon, or crevasse was still in sight but no longer centered. "Co-pilot — new prediction!"

"What happened?" Corley demanded.

"Quiet!"

"Prediction," Bowles chanted, "blast at — at three nine oh."

Barnes was adjusting verniers for his own prediction as Bowles reported. "Check," he answered. "Cover at three seven oh." He threw one glance at the TV screen. The crevasse was toward the edge of the screen; the ground below looked fairly smooth. Unquestionably the ship had a slight drift. All he could do was hope that the gyros would keep them from toppling. "*Brace for crash*!"

480 — 450 — 400 — He jabbed the button.

The terrible pressure shoved his head back; be lost sight of the altimeter. He caught it again — 190 — 150 — 125 — At "fifty" he snatched his finger away and prayed.

The jet cut off sloppily as always. A grinding jar slammed him more deeply into the cushions The ship lurched like an unsteady top — and stayed upright.

Barnes found that he had been holding his breath a long time.

## Chapter Eight

*Columbus found a pleasant climate rich land docile natives. Nowhere in our System did explorers find conditions friendly to men — and nowhere was this more brutally true than on our nearest neighbor.*

*-Farquharson, Ibid., III: 420*

Barnes felt dazed, as if wakening from a confusing dream. Bowles' voice recalled him to the present. "Jacks are down, skipper. Unclutch the gyros?"

He pulled himself together. "Check our footing first. I'll — Say! *We're on the Moon*!" Frantically he unstrapped.

"We sure are!" answered Bowles. "A fine landing, Jim. I was scared."

"It was terrible, and you know it."

"We're alive, aren't we? Never mind — *we made it.*"

Corley interrupted them. "Power plant secured."

Barnes looked startled. "Oh, sure. Traub, your department okay?"

Mannie answered weakly, "I guess so. I think I fainted."

"Nonsense!" Bowles reassured him. "Come on — let's look."

The four crowded at the portside port and stared out across an umber plain, baking under an unchecked sun, now not far from zenith. Miles away, jutting up into black, star-studded sky, were the peaks they had seen. In the middle distance was a single pock mark, a crater a mile or less across. Nothing else broke the flat desolation ... endless, lifeless waste, vacuum sharp and kiln dry.

Traub broke the silence with an awed whisper. "Gosh, what a place! How long do we stay, Mr. Barnes?"

"Not long, Mannie." He tried to make his words carry conviction. "Doc," he went on, "let's check the mass ratio."

"Okay, Jim."

Bowles went to the starboard port; one glance through it and he sang out, "Hey — see this."

They joined him. Below was the dark chasm in which they had almost landed. It ran close to the ship; one jack almost touched the edge. Barnes looked down into its awesome depths and felt no regret about expending mass to avoid it.

Bowles stared at it. "I repeat, Jim, a fine landing."

"Too close for comfort."

Bowles pushed his face to the quartz and tried to see farther to right and left. "I'm turned around," he complained. "Which way is Earth?"

"Earth is east, of course," Corley answered.

"Which way is east?"

"Man, you certainly are confused. East is out the other port."

"But it *can't* be. We looked out there first and Earth wasn't in sight." Bowles crossed back to the other port.

"See?"

Corley joined him. "That's east," he stated. "Look at the stars."

Bowles looked. "But something is screwy. I saw Earth before we landed, in the screen. You saw it, didn't you, Jim?"

"Yes, I saw it."

"You; Doc?"

"I was too busy. How high was it?"

"Just rising. But I saw it."

Corley looked at the sky, then at the mountains. "Sure, you did. And it's there — back of those mountains."

Barnes whistled tonelessly. "That's it. I've landed us a few miles too short."

Bowles looked whipped. "Out of line-of-sight," he said dully. "I could claim it until hell freezes — and I can't get the message back."

Traub looked startled. "We're cut off from Earth? But I saw it, too."

"Sure, you did," agreed Barnes, "you saw it while we had altitude. Now we're down too low."

"Oh." Traub looked out. "But it isn't serious, is it?

Earth is back of those mountains — but it's in the east; it will rise after a bit. How fast does the Moon turn? Twenty-eight days and something?"

Barnes turned to Corley. "You tell him, Doc."

"Mannie — the Earth doesn't rise or set."

"Huh?"

"The Moon keeps the same face to the Earth all the time. From any one spot, the Earth doesn't move; it just hangs."

"Huh?" Traub raised his hands, stared at them; it could be seen that

he was visualizing it, using his fists for Earth and Moon. "Oh — I get it." He looked dismayed. "Say, that's bad. That's really bad."

"Snap out of it, Mannie," Barnes said quickly. "If we can't contact Earth, we'll just have to wait until we get back." He said nothing about his own fears.

Bowles smashed a fist into a palm. "We've got to contact Earth! It doesn't matter whether we get back; four casualties is cheap. But to get a message through now — *this* message, that a United States vessel has landed and taken possession — can mean the salvation of the United States." He turned to Corley. "Doctor, we have enough power to lift us over those mountains, haven't we?"

"Eh? Why, yes."

"Then let's do it — now." He turned toward his couch. "Hold it, Red!" Bowles stopped; Barnes went on, "If we make one lift and drop, to near those mountains, you know what that does to our chances of getting back."

"Of course! It's not important; we owe it to our country."

"Maybe so. Maybe not." Barnes paused. "If it turns out that we don't have enough juice left to break free of the Moon, I'll concede your point."

"Jim Barnes, we can't consider ourselves against the safety of our country."

"Speak for yourself, Red. Conceded that a claim to the Moon might help out the State Department this week — again it might not. It might stimulate Russia into going all out for space travel while the United States stumbles along as before, proud that we claimed it, but unwilling to spend real money to make it stick."

"Jim, that's sophistry."

"So? That's my decision. We'll try everything else first. You don't know you can't get a message through. Why don't you try?"

"When we're not in line-of-sight? Don't be silly."

"Earth is not far down behind those mountains. Find a place that *is* line-of-sight."

"Oh. Now you make sense." Bowles looked out at the mountains. "I wonder how far away they are?"

"Tell you in a moment," Traub offered. "Wait till I swing the soup bowl around." He started for his couch.

"Never mind, Mannie!" put in Barnes. "No — go ahead. It won't

hurt to know. But I wasn't talking about the mountains, Red. They are too far away. But if you scout around, you may find a spot from which the mountains are low enough to let you see Earth. Or you might find some hills — we can't see all around from inside here. Mannie, is it possible to take out the radio and use it outside the ship?"

"Outside? Let me see — The transmitter is unpressurized; I guess I could jigger it. How about power?"

Bowles said, "Doc, how much cable can we dig up?" Barnes cut in, "Find your spot, then we'll see what's needed."

"Right! Jim, I'll go out at once. Mannie, come with me and we'll find a spot."

"Outside?" Traub said blankly.

"Sure. Don't you want to be the first man to set foot on the Moon?"

"Uh, I guess so." Traub peered out at the blazing unfriendly surface.

Corley got an odd look; Barnes noted it and said, "One moment, Red. Doc is entitled to the honor of being first. After all, the Corley engine made it possible."

"Oh, sure! Doc can be first down the ladder. Let's all go."

"I'll go later," Barnes decided. "I've got work to do."

"As you wish. Come on, Doc."

Corley looked shy. "Oh, I don't have to be first. We all did it, together."

"Don't be modest. Into our suits — let's go!" Thoughts of military policy seemed to have left Bowles' mind; he was for the moment boyishly eager for adventure. He was already undogging the hatch that led down into the airlock.

-

Barnes helped them dress. The suits were modifications of high-altitude pressure suits used by jet pilots — cumbersome, all-enclosing skins not unlike diving suits and topped off with "goldfish bowl" helmets. The helmets were silvered except for the face plates; a walkie-talkie radio, two oxygen bottles, and an instrument belt completed the main features of a suit. When they were dressed but not helmeted, Barnes said, "Stay in sight of the ship and each other. Red, when you shift from tank one to tank two, git for home and don't dawdle."

"Aye aye."

"I'm going now." He gasketed their helmets, leaving Corley to the

last. To him he said softly, "Don't stay long. I need you."

Corley nodded. Barnes fastened the doctor's helmet, then climbed up into the control room and closed the hatch. Corley waited until Barnes was clear, then said, "Check radios. Check instruments."

"Okay, Doctor," Traub's voice sounded in his earphones.

"Okay here," added Bowles.

"Ready for decompression?" They assented; Corley touched a button near the door; there came a muted whine of impellers. Gradually his suit began to lift and swell. The feeling was not new; he had practiced in their own vacuum chamber back at Mojave. He wondered how Traub felt; the first experience with trusting a Rube Goldberg skin could be frightening. "How are you doing, Mannie?"

"All right."

"The first time seems odd, I know."

"But it's not the first time," Traub answered. "I checked these walkie-talkies in the chamber at the job."

"If you gentlemen are through chatting," Bowles cut in, "you'll note that the tell-tale reads 'vacuum'."

"Eh?" Corley turned and undogged the outer door.

He stood in the door, gazing north. The aching, sun-drenched plain stretched to a black horizon. On his right, knife sharp in the airless moonscape, was the wall of mountains they had grounded to avoid. He lifted his eyes and made out the Big Dipper, midnight clear above a dazzling, noonday desert.

Bowles touched his arm. "One side, Doc. I'll rig the ladder."

"Sorry."

Bowles linked the ends of a rope ladder to hooks outside the door. Finished, he kicked the ladder out. "Go ahead, Doc."

"Uh, thanks." Corley felt for the first rung. It was a clumsy business in the pressure suit. Finally he knelt, grasped the threshold, got a toe in and started down.

It was awkward, rather than hard work. Suit and all, he weighed less than forty pounds. He found it easier to lower himself by his hands alone. He could not see below his chin, but the shape of the ship let him know his progress. Finally he was even with the jets. He lowered himself a bit more, felt for the ground — and kicked his toe into the lunar soil.

Then he was standing on it.

He stood there a moment, his heart pounding. He was trying to realize it, take it in, and found himself unable to do so. He had lived the moment too many thousands of times in too many years of dreams. It was still a dream. A foot brushed his shoulder; he stepped back to avoid being stepped on by Traub. Soon Bowles joined them. "So this is it," the Admiral said inanely and turned slowly around. "Look, Mannie! Hills! Not far away."

Corley saw that Bowles was looking under the jets to the south. The plain was broken there with a sharp eruption of rock. Corley touched Bowles' arm. "Let's get away from the ship. Here where the jets splashed is probably a bit radioactive."

"Okay." Bowles followed him; Traub brought up the rear.

## Chapter Nine

*Columbus had one motive; Queen Isabella had another —*
Farquharson, Ibid., III: 421

On climbing back into the control room Barnes did not immediately get to work. Instead he sat down and thought. For the last — two days, was it? three days? four days, really — he had had no chance to collect his thoughts, drop his public mask and invite his soul.

He felt unutterably weary. He lifted his eyes to the mountains. There they stood, tall and forbidding, witnesses that he had accomplished his driving purpose.

To what end? To let Corley explore the dark outer reaches of science? To help Bowles insure the safety of western civilization — or perhaps hasten a new crisis?

Or to make orphans of four kids whose old man was "a very domestic type guy" but could be shamed into coming along?

No, he knew it had been because Jimmy Barnes had been small for his age, clumsy with his fists, no decent clothes — so he had to make more money, boss more men, build faster planes than anyone else. He, James A. Barnes, had reached the Moon because he had never been sure of himself.

He wondered about Mannie's kids and his stomach was a rock inside him.

He threw off the mood and went to the radio controls, keyed the walkie-talkie circuit and called out, "This is Jim Barnes, kiddies, coming to you by courtesy of 'SLUMP,' the Super soap. Come in, come in, wherever you are!"

"Jim!" Bowles' voice came back. "Come on out."

"Later," Barnes answered. "Where's Doc?"

"Right here," Corley answered. "I was just coming back."

"Good," said Barnes. "Red, I'll leave this switched on. Sing out now and then."

"Sure thing," Bowles agreed.

Barnes went to the desk and began toting up mass reserves. An orbit computation is complicated; calculating what it takes to pull free of a planet is simple; he had a rough answer in a few minutes.

He ran his hand through his hair. He still needed that haircut — and no barbers on this block. He wondered if it were true that a man's hair continued to grow after his death.

The hatch creaked and Corley climbed into the room. "Whew!" be said. "It's good to get out of that suit. That sun is really hot."

"Wasn't the gas expansion enough to keep you cool?"

"Not cool enough. Those suits are hard to get around in, too, Jim — they need a lot of engineering."

"They'll get it," Barnes answered absently, "but reengineering this ship is more urgent. Not the Corley engine, Doc; the controls. They aren't delicate enough;"

"I know," Corley admitted. "That poor cutoff — we'll have to design a prediction for it into the autopilot, and use a feedback loop."

Barnes nodded. "Yes, sure, *after* we get back — and if we get back." He tossed his fingers at the scientist. "Hum that through."

Corley glanced at it. "I know."

"Red won't find a spot in line-of-sight with home; those mountains are infernally high. But I wanted him out of the way — and Mannie. No use talking to Red, he's going to get a posthumous Congressional Medal if it kills him — and us too."

Corley nodded. "But I'm with him on trying to contact Earth; I need it worse than he does."

"Hastings?"

"Yes. Jim, if we had enough margin, we could blast off and correct after radio contact. We haven't; if we get off at all it will be close."

"I know. I spent our ticket home, when I made that extra blast."

"What good would it have done to have crashed? Forget it; I need

Hastings. We need the best orbit possible."

"Fat chance!"

"Maybe not. There's libration, you know."

Barnes looked startled. "Man, am I stupid!" He went on eagerly, "What's the situation now? Is Earth swinging up, or down?"

-

The Moon's spin is steady, but its orbit speed is not; it moves, fastest when it is closest to Earth. The amount is slight, but it causes the Moon to appear to wobble each month as if the Man-in-the-Moon were shaking his head. This moves the Earth to-and-fro in the lunar sky some seven degrees.

Corley answered, "It's rising — I think. As to whether it will rise enough — well, I'll have to compute Earth's position and then take some star sights."

"Let's get at it. Can I help?"

Before Corley could reply Bowles' voice came over the speaker: "Hey! Jim!"

Barnes keyed the walkie-talkies. "Yes, Red?"

"We're at the hills south of the ship. They might be high enough. I want to go behind them; there may be an easier place to climb."

On the airless Moon, all radio requires line-of-sight — yet Barnes hated to refuse a reasonable request. "Okay — but don't take any chances."

"Aye aye, Skipper." 'Barnes turned to Corley. "We need the time anyhow."

"Yes," Corley agreed. "You know, Jim, this isn't the way I imagined it. I don't mean the Moon itself — just wait until we get some pressurized buildings here and some decent pressure suits. But what I mean is what we find ourselves doing. I expected to cram every minute with exploring and collecting specimens and gathering new data. Instead I'll beat my brains out simply trying to get us back."

"Well, maybe you'll have time later — too much time."

Corley grudged a smile. "Could be —"

He sketched out the relative positions of Earth and Moon, consulted tables. Presently he looked up. "We're in luck. Earth will rise nearly two and a half degrees before she swings back."

"Is that enough?"

"We'll see. Dig out the sextant, Jim." Barnes got it and Corley took it to the eastern port. He measured the elevations of three stars above the tops of the mountains. These he plotted on a chart and drew a line for the apparent horizon. Then he plotted Earth's position relative to those stars.

"Finicky business," he complained. "Better check me, Jim."

"I will. What do you get?"

"Well — if I haven't dropped a decimal point, Earth will be up for a few hours anyway three days from now."

Barnes grinned. "We'll get a ticker-tape parade yet, Doc."

"Maybe. Let's have another look at the ballistic situation first."

Barnes' face sobered.

Corley worked for an hour, taking Barnes' approximation and turning it into something slightly better. At last he stopped. "I don't know," he fretted. "Maybe Hastings can trim it a little."

"Doc," Barnes answered, "suppose we jettison everything we can? I hate to say it, but there's all that equipment you brought."

"What do you think I've been doing with these weight schedules? Theoretically the ship is stripped."

"Oh. And it's still bad?"

"It's still bad."

Bowles and Traub returned worn out and just short of sun stroke. The Admiral was unhappy; he had not been able to find any way to climb the hills: "I'll go back tomorrow," he said stoutly. "I mean after we've eaten and slept."

"Forget it," advised Barnes.

"What do you mean?"

"We are going to have line-of-sight from here."

"Eh? Repeat that."

"Libration," Barnes told him. "Doc has already calculated it."

Bowles' face showed delighted comprehension. Traub looked puzzled; Barnes explained it.

"So you see," Barnes went on, we'll have a chance to send a message in about seventy hours."

Bowles stood up, his fatigue forgotten. "That's all we need!" He pounded his palm exultantly.

"Slow down, Red," Barnes advised, "our chances of taking off look worse than ever."

"So?" Bowles shrugged. "It's not important."

"Oh, for Pete's sake! Drop the Nathan Hale act. Have the common decency to give a thought to Mannie and his four kids."

Bowles started to retort, stopped — then went on again with dignity. "Jim, I didn't mean to annoy you. But I meant what I said. It's not important to get back, as long as our message gets through. Our mistakes will make it easier for the next expedition. In a year the United States can have a dozen ships, better ships, on the Moon. Then no country would be so foolhardy as to attack us. That is important; we aren't."

He went on, "Every man dies; the group goes on. You spoke of Mannie's kids. You have no children, nor has Corley. Mannie has — so I know he understands what I mean better than you do." He turned to Traub. "Well, Mannie?"

Traub looked up, then dropped his eyes. "Red is right, Mr. Barnes," he answered in a low voice, "but I'd like to get home."

Barnes bit his lip. "Let's drop it," he said irritably. "Red, you might rustle up some supper."

-

For three days, Earth time, they labored. Bowles and Barnes stripped the ship — cameras, empty oxygen bottles, their extra clothing, the many scientific instruments Corley had hoped to use — Wilson cloud chamber, Geiger counter, a 12" Schmidt camera and clock, still cameras, the autocamera, ultra- and infra-spectrographs, other instruments. Corley stayed at his desk, computing, checking, computing again — getting the problem in the best possible shape to turn over to Hastings. Traub overhauled his radio and lined up his directional antenna to the exact orientation at which Earth would appear.

The hour finally crept up to them. Traub, was in his couch at the radio controls while the rest crowded at the eastern port. What they needed to say had been made one message: A formal claim to the Moon, setting forth time and place of landing, a long and technical message to Hastings, and finally code groups supplied by Bowles. Traub would send it all out as one, many times if necessary.

"I see it!" It was Corley who claimed the distinction. Barnes stared at the spot. "Your imagination, Doe; a highlight on the peaks." The sun was behind them, "afternoon" by local time; the mountains were

bright in the east.

Bowles put in, "No, Jim. There's something there." Barnes turned. "Start sending!"

Traub closed his key.

The message was repeated, with listening in between, time after time. An arc of Earth slowly, terribly slowly, crept above the horizon. No answer came back, but they did not despair, so little of Earth was as yet in sight. Finally Barnes turned to Corley. "What does that look like, Doc? The part we can see, I mean."

Corley peered at it. "Can't say. Too much cloud."

"It looks like ocean. If so, we won't get a jingle until it's higher."

Corley's face slowly became horror struck. "What's the matter?" demanded Barnes.

"Good grief! *I forgot to figure the attitude*."

"Huh?"

-

Corley did not answer. He jumped to the desk, grabbed the Nautical Almanac, started scribbling, stopped, and drew a diagram of the positions of Earth, Sun, and Moon. On the circle representing the Earth he drew a line for the Greenwich meridian.

Barnes leaned over him. "Why the panic?"

"That is ocean, the Pacific Ocean." Bowles joined them. "What about it?"

"Don't you see? Earth turns to the east; America is moving away — already out of sight." Corley hurriedly consulted his earlier calculations. "Earth reaches maximum elevation in about, uh, four hours and eight minutes. Then it drops back."

Traub pushed up an earphone. "Can't you guys shut up?" he protested. "I'm trying to listen."

Corley threw down his pencil. "It doesn't matter, Mannie. You aren't ever going to be in line-of-sight with NAA."

"Huh? What did you say?"

"The Earth is faced wrong. We're seeing the Pacific Ocean now, then we'll see Asia, Europe, and finally the Atlantic. By the time we should see the United States it will have dropped back of the mountains."

"You mean I'm just wasting time?"

"Keep sending, Mannie," Barnes said quietly, "and keep listening. You may pick up another station."

Bowles shook his head. "Not likely."

"Why not? Hawaii may still be in sight. The Pearl Harbor station is powerful."

"Provided they have rigged a beam on us, same as NAA."

"Well, keep trying, Mannie."

Traub slipped his earphone back in place. Bowles went on, "It's nothing to get excited about. We'll be picked up anywhere." He chuckled. "Soviet stations will be listening to us shortly. They will be broadcasting denials at the same time stations in Australia are telling the world the truth."

Corley looked up. "But I won't get to talk to Hastings!"

Bowles said very gently: "As I said, that isn't important in the long run."

Barnes said, "Stow it, Red. Don't get downhearted, Doc — there is a good chance that some other station will beam us. Keep trying, Mannie."

"Will you guys *please* shut up?"

He did keep trying over and over again; in the intervals he listened, not only to the beam frequency of NAA, but all over the dial.

More than eight hours later the last faint arc of Earth had vanished. No one had thought to eat and Traub had not left his post for any purpose.

-

They went on preparing to leave, but their hearts were not in it. Corley stayed at his desk, except for snatches of sleep, trying to make up by effort for the lack of fine tools. He set the departure ahead to, give him more time.

The aching, cloudless lunar day wore on and the sun sank to the west. They planned to risk it just at sundown. It was admitted by Corley — and by Barnes, who checked his figures — that the situation theoretically did not permit success. By the book, they would rise, curve around the Moon, and approach the border where the fields of Earth and Moon balance — but they would never reach it; they would fall back and crash.

It was also agreed, by everyone, that it was better to die trying than to wait for death. Bowles suggested that they wait a month until

next sight of Earth, but arithmetic shut off that chance; they would not starve; they would not die of thirst — they would suffocate.

Bowles took it serenely; Traub lay in his bunk or moved like a zombie. Corley was a gray-faced automaton, buried in figures. Barnes became increasingly irritable.

-

As a sop to Corley, Bowles made desultory readings on the instruments Corley had not had time to use. Among the chores was developing the films taken on the flight across the back face. It had been agreed to keep them, they weighed ounces only, and it was desirable to develop them to prevent fogging by stray radioactivity. Barnes assigned Traub the task, to keep him busy.

Traub worked in the airlock, it being the only darkroom. Presently he came poking his head up through the hatch. "Mr. Barnes?"

"Yes, Mannie?" Barnes noted with satisfaction that Traub showed his first touch of animation since his ordeal.

"See what you make of this." Traub handed him a negative. Barnes spread it against a port. "See those little round things? What are they?"

"Craters, I guess."

"No, these are craters. See the difference?"

Barnes tried to visualize what the negative would look like in positive. "What do you think?"

"Well, they look like hemispheres. Odd formation, huh?"

Barnes looked again. "Too damned odd," he said slowly. "Mannie, let's have a print."

"There's no print paper, is there?"

"You're right; my error."

Bowles joined them. "What's the curiosity? Moon maidens?"

Barnes showed him. "What do you make of those things?"

Bowles looked, and looked again. Finally he asked, "Mannie, how can we enlarge this?"

It took an hour to jury-rig a magic lantern, using a pilfered camera lens. They all gathered in the airlock and Traub switched on his improvised projector.

Bowles said, "Focus it, for cripes' sake." Traub did so. The images of his "hemispheres" were reasonably distinct. They were six in number, arranged in a semicircle — and they were unnatural in appearance.

Barnes peered at them. "Red — you were a bit late when you claimed this planet."

Bowles said, "Hmmm —" Finally he emphatically added, "Constructions."

"Wait a minute," protested Corley. "They look artificial, but some very odd formations are natural."

"Look closer, Doc," Barnes advised. "There is no reasonable doubt. The question: were we a year or so late in claiming the Moon? Or millions of years?"

"Eh?"

"Those are pressure domes. Who built them? Moon people, long before history? Visiting Martians? Or Russians?"

Traub said, "Mr. Barnes — why not *live* Moon people?"

"What? Take a walk outside."

"I don't see why not. As soon as I saw them I said, 'That's where those flying saucers came from a while back."

"Mannie, there were no flying saucers. Don't kid yourself."

Traub said, doggedly, "I knew a man who —"

"— saw one with his own eyes," Barnes finished. "Forget it. That's our worry — there. They're real. They show on film."

"Forget Martians, too," Bowles said gruffly, "and any long-dead Moon people."

"I take it you go for Russians?" Barnes commented. "I simply know that those films must be in the hands of military intelligence as soon as possible."

"Military intelligence? Ah, yes, on Earth — a lovely thought."

"Don't be sarcastic. I mean it."

"So do I."

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From willingness to die, his mission accomplished, Bowles became frantic to live, to get back. It made him bitter that he himself had insisted on landing — with all-important new evidence even then latent in the ship.

He sweated out a possible scheme to get the films back to Washington and seized a time when Traub was out of the ship to propose it to Barnes. "Jim — could you get this ship back by yourself?"

"What do you mean?"

"You checked the figures. One man might make it — if the ship were lightened by the other three."

Barnes looked angry. "Red, that's nonsense."

"Ask the others."

"*No*!" Barnes added, "Four men came; four go back — or nobody does."

"Well, I can lighten ship, at least. That's my privilege."

"Any more such talk and it'll be your privilege to be strapped down till takeoff!"

Bowles took Barnes' arm. "Those films have got to reach the Pentagon."

"Quit breathing in my face. We'll make it if we can. Have you anything left to jettison?"

"Jim, this ship gets back if I have to drag it."

"Drag it, then. Answer my question."

"I've got the clothes I stand in — I'll jettison them." Bowles looked around. "Jettison, he says. Jim Barnes, you call this ship stripped. Bye God, I'll show you! Where's that tool kit?"

"Traub just took it outside along with other stuff."

Bowles jumped to the microphone. "Mannie? Bring back the hacksaw; I need it!" He turned to Barnes. "I'll show you how to strip ship. What's that radio doing there? Useless as a third leg. Why do I need an autopilot display? Yours is enough. Doc — get up off that stool!"

-

Corley looked up from his closed world of figures. He had not even heard the row. "Eh? You called me?"

"Up off that stool — I'm going to unbolt it from the deck."

Corley looked puzzled. "Certainly, if you need it." He turned to Barnes. "Jim, these are the final figures."

Barnes was watching Bowles. "Hold the figures, Doc. We may make a few revisions."

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Under the drive of Bowles' will they stripped ship again, fighting against their deadline. Rations — *all* rations — men do not starve

quickly. Radios. Duplicate instruments. Engineering instruments not utterly essential to blasting. The hot plate. Cupboards and doors, light fixtures and insulation; everything that could be hacksawed away or ripped out bodily. The ladder from control room to airlock — that was kicked outlast, with three space suits and the rope ladder.

Bowles found no way to get rid of the fourth pressure suit; he had to wear it to stay alive while he pushed out the last items — but he found a way to minimize even that. He removed the instrument belt, the back pack, the air bottles, the insulating shoes, and stood there, gasping the air left in the suit, while the lock cycled from "vacuum" to "pressure" for the last time.

Three hands reached down and pulled him through the hatch. "Stations!" Barnes snapped. "Stand by to blast!"

They were waiting for the count off, when Traub reached up and touched Barnes' arm. "Skipper?"

"Yes, Mannie?"

Traub looked to see if the other two were noticing; they were not. "Are we really going to make it?"

Barnes decided to be truthful. "Probably not." He glanced at Bowles; the Admiral's features were sunken; his false teeth had gone with the rest. Barnes grinned warmly. "But we're sure going to give it a try!"

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*The monument where the proud* Luna *once stood is pictured in every schoolroom. Many trips followed, some tragic, some not, before space transportation reached its present safe operation. The spaceways are paved with the bodies and glorious hopes of pioneers. With accomplishment of their dream some of the romance has gone out of space.*

-Farqüharson, *Ibid.*, Hi: 423

# Shooting Destination Moon

"Why don't they make more science fiction movies?"

The answer to any question starting, "Why don't they —" is almost always, "Money."

I arrived in Hollywood with no knowledge of motion picture production or costs, no experience in writing screen plays, nothing but a yen to write the first Hollywood picture about the first trip to the Moon. Lou Schor, an agent who is also a science fiction enthusiast, introduced me to a screen writer, Alford van Ronkel; between us we turned out a screen play from one of my space travel stories.

So we were in business — Uh, not quite. The greatest single production problem is to find someone willing to risk the money. People who have spare millions of dollars do not acquire them by playing angel to science fiction writers with wild ideas.

We were fortunate in meeting George Pal of George Pal Productions, who became infected with the same madness. So we had a producer — now we were in business.

Still not quite — Producers and financiers are not the same thing. It was nearly a year from the writing of the screen play until George Pal informed us that he had managed to convince an angel. (How? Hypnosis? Drugs? I'll never know. If I had a million dollars, I would sit on it and shoot the first six science fiction writers who came my way with screen plays.)

Despite those huge Hollywood salaries, money is as hard to get in Hollywood as anywhere. The money men in Hollywood write large checks only when competition leaves them no alternative; they prefer to write small checks, or no checks at all. Even though past the big hurdle of getting the picture financed, money trouble remains with one throughout production; if a solution to a special-effects problem costs thirty thousand dollars but the budget says five thousand dollars, then you have got to think of an equally good five thousand dollar solution — and that's all there is to it.

I mention this because there came a steady stream of non-motion-picture folk who were under the impression that thousand-dollar-a-week salaries were waiting for them in a science fiction picture. The budget said, "No!"

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The second biggest hurdle to producing an accurate and convincing science fiction picture is the "Hollywood" frame of mind — in this case, people in authority who either don't know or don't care about scientific correctness and plausibility. Ignorance can be coped with; when a man asks "What does a rocket have to push against, out there in space?" it is possible to explain. On the other hand, if his approach is, "Nobody has ever been to the Moon; the audiences won't know the difference," it is impossible to explain anything to him; he does not know and does not want to know.

We had plenty of both sorts of trouble.

That the picture did not end up as a piece of fantasy, having only a comic-book relation to real science fiction, I can be attributed almost entirely to the integrity and good taste of Irving Pichel, the director. Mr. Pichel is not a scientist, but he is intelligent and honest. He believed what Mr. Bonestell and I told him and saw to it that what went on the screen was as

accurate as budget and ingenuity would permit.

By the time the picture was being shot the entire company — actors, grips, cameramen, office people — became imbued with enthusiasm for producing a picture which would be scientifically acceptable as well as a box office success. Willy Ley's *Rockets and Space Travel* was read by dozens of people in the company. Bonestell and Ley's *Conquest of Space* was published about then and enjoyed a brisk sale among us. Waits between takes were filled by discussions of theory and future prospects of interplanetary travel.

As shooting progressed we began to be deluged with visitors of technical background — guided missiles men, astronomers, rocket engineers, aircraft engineers. The company, seeing that their work was being taken seriously by technical specialists, took pride in turning out an authentic job. There were no more remarks of "What difference does it make?"

Which brings us to the third hurdle — the technical difficulties of filming a spaceship picture.

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The best way to photograph space flight convincingly would be to raise a few hundred million dollars, get together a scientific and engineering staff of the caliber used to make the A-bomb, take over the facilities of General Electric, White Sands, and Douglas Aircraft, and build a spaceship.

Then go along and photograph what happens.

We had to use the second-best method — which meant that every shot, save for a few before takeoff from Earth, had to involve special effects, trick photography, unheard-of lighting problems. All this is expensive and causes business managers to grow stomach ulcers. In the ordinary motion picture there may be a scene or two with special effects; this picture had to be all special effects, most of them never before tried.

If you have not yet seen the picture, I suggest that you do not read further until after you have seen it; in this case it is more fun to be fooled. Then, if you want to look for special effects, you can go back and see the picture again. (Adv.)

The Moon is airless, subject only to one-sixth gravity, bathed in undiluted sunlight, covered with black sky through which shine brilliant stars, undimmed by cloud or smog. It is a place of magnificent distances and towering mountains.

A sound stage is usually about thirty feet high, and perhaps a hundred and fifty feet long. Gravity is Earth normal. It is filled with cigarette smoke, arc light fog, and dust — not to mention more than a hundred technicians.

Problem: to photograph in a sound stage men making a rocket landing on the Moon, exploring its endless vistas, moving and jumping under its light gravity. Do this in Technicolor, which adds a sheaf of new problems, not the least of which is the effect of extra hot lights on men wearing spacesuits.

The quick answer is that it can't be done.

A second answer is to go on location, pick a likely stretch of desert, remove by hand all trace of vegetation, and shoot the "real" thing. Wait a minute; how about that black and star-studded sky? Fake it — use special effects. Sorry; once blue sky is on Technicolor emulsion it is there to stay. With black-and-white there are ways, but not with color.

So we are back on the sound stage and we have to shoot it there. Vacuum clear atmosphere? No smoking — hard to enforce — high speed on all blowers, be resigned to throwing away some footage, and leave the big doors open — which lets in noise and ruins the sound track. Very well, we must dub in the sound — and up go the costs — but the air must be clear.

Low gravity and tremendous leaps — piano wire, of course — but did you ever try to wire a man who is wearing a spacesuit? The wires have to get inside that suit at several points, producing the effect a nail has on a tire, i.e., a man -wearing a pressurized suit cannot be suspended on wires. So inflation of suits must be replaced by padding; at least during

wired shots. But a padded suit does not wrinkle the same way a pressurized suit does and the difference shows. Furthermore, the zippered openings for the wires can be seen. Still worse, if inflation is to be faked with padding, how are we to show them putting on their suits? -

That sobbing in the background comes from the technical adviser — yours truly — who had hoped not only to have authentic pressure suits but had expected to be able to cool the actors under the lights by the expansion of gas from their air bottles. Now they must wear lamb's wool padding and will have no self-contained source of breathing air, a situation roughly equivalent to doing heavy work at noon in desert summer, in a fur coat while wearing a bucket over your head. Actors are a hardy breed. They did it.

To get around the shortcomings of padded suits we worked in an "establishing scene" in which the suits were shown to be of two parts, an outer chafing suit and an inner pressure suit. This makes sense; deep-sea divers often use chafing suits over their pressure suits, particularly when working around coral. The relationship is that of an automobile tire carcass to the inner tube. The outer part takes the beating and the inner part holds the pressure. It is good engineering and we present this new wrinkle in spacesuits without apology. The first men actually to walk the rugged floor of the Moon and to climb its sharp peaks, will, if they are wise, use the same device.

So we padded for wire tricks and used air pressure at other times. Try to see when and where we switched. I could not tell — and I saw the scenes being shot.

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Now for that lunar landscape which has to be compressed into a sound stage — I had selected the crater Aristarchus. Chesley Bonestell did not like Aristarchus; it did not have the shape he wanted, nor the height of Crater wall, nor the distance to apparent horizon. Mr. Bonestell knows more about the surface appearance of the Moon than any other living man; he searched around and found one he liked — the crater Harpalus, in high northern latitude, facing the Earth. High latitude was necessary so that the Earth would appear down near the horizon where the camera could see it and still pick up some lunar landscape; northern latitude was preferred so that Earth would appear in the conventional and recognizable schoolroom-globe attitude.

Having selected it, Mr. Bonestell made a model of it on his dining room table, using beaverboard, plasticine, tissue paper, paint, anything at hand. He then made a pinhole photograph from its center — Wait; let's list the stages:

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1. A Mount Wilson observatory photograph.

2. Bonestell's tabletop model.

3. A pinhole panorama.

4. A large blowup. -

5. A Bonestell oil painting, in his exact detail, about twenty feet long and two feet high, in perspective as seen from the exit of the rocket, one hundred fifteen feet above the lunar surface.

6. A blownup photograph, about three feet high, of this painting.

7. A scenic painting, about four feet high, based on this photograph and matching the Bonestell colors, but with the perspective geometrically changed to bring the observer down to the lunar floor.

8. A scenic backing, twenty feet high, to go all around a sound stage, based on the one above, but

with the perspective distorted to allow for the fact that sound stages are oblong.

9. A floor for the sound stage, curved up to bring the foreground of the scene into correct perspective with the backing. -

10. A second back drop of black velvet and "stars."

-

The result you see on the cover of this issue. It looks like a Bonestell painting because jt is a Bonestell painting — in the same sense that a Michelangelo mural is still the work of the master even though a dozen of the master's pupils may have wielded the brushes.

Every item went through similar stages. I was amazed at the thoroughness of preliminary study made by the art department — Ernst Fegte and Jerry Pycha — before any item was built to be photographed. Take the control room of the spaceship. This compartment was shaped like the frustrum of a cone and was located near the nose of spaceship *Luna*. It contained four acceleration couches, instruments and controls of many sorts, an airplane pilot's seat with controls for landing on Earth, radar screens, portholes, and a hatch to the air lock — an incredibly crowded and complicated set. (To the motion picture business this was merely a "set," a place where actors would be photographed while speaking lines.)

To add to the complications the actors would sometimes read their lines while hanging upside down in midair in this set, or walking up one of its vertical walls. Add that the space was completely enclosed, about as small as an elevator cage, and had to contain a Technicolor sound camera housed in its huge soundproof box — called a "blimp," heaven knows why.

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I made some rough sketches. Chesley. Bonestell translated these into smooth drawings, adding in his own extensive knowledge of spaceships. The miniature shop made a model which was studied by the director, the art director, and the cameraman, who promptly tore it to bits. It wouldn't do at all; the action could not be photographed, could not even be seen, save by an Arcturian Bug-Eyed Monster with eyes arranged around a spherical 360o.

So the miniature shop made another model, to suit photographic requirements.

So I tore that one apart. I swore that I wouldn't be found dead around a so-called spaceship control room arranged in any such fashion; what were we making? A comic strip?

So the miniature shop made a third model.

And a fourth.

-

Finally we all were satisfied. The result, as you see it on the screen, is a control room which might very well be used as a pattern for the ship which will actually make the trip some day, provided the ship is intended for a four-man crew. It is a proper piece of economical functional design, which could do what it is meant to do.

But it has the unique virtue that it can be photographed as a motion picture set.

A writer — a fiction writer, I mean; not a screen writer — is never bothered by such considerations. He can play a dramatic scene inside a barrel quite as well as in Grand Central Station. His mind's eye looks in any direction, at any distance, with no transition troubles and no jerkiness. He can explain anything which is not clear. But in motion pictures the camera has got to see what is going on and must see it in such a fashion that the audience is not even aware of the camera, or the illusion is lost. The camera must see all that it needs to see to achieve a single emotional effect from a single angle, without bobbing back and forth, or indulging in awkward, ill-timed cuts. This problem is always present in motion picture photography; it was simply exceptionally acute in the control room scenes. To solve it all was a real *tour de force*; the director of photography, Lionel Linden, aged several years before we got out of that electronic Iron Maiden.

In addition to arranging the interior for camera angles it was necessary. to get the camera to the selected angles — in this enclosed space. To accomplish this, every panel in the control room was made removable — "wild," they call it — so that the camera could stick in its snout and so that lights could be rigged. Top and bottom and all its sides — it came apart like a piece of Meccano. This meant building of steel instead of the cheap beaverboard-and-wood frauds usually photographed in Hollywood. The control room was actually stronger and

heavier than a real spaceship control room would be. Up went the costs again.

Even with the set entirely "wild" it took much, much longer to shift from one angle to another angle than it does on a normal movie set, as those panels had to be bolted and unbolted, heavy lights had to be rigged and unrigged — and the costs go sky high. You can figure overhead in a sound stage at about a thousand dollars an hour, so, when in the movie you see the pilot turn his head and speak to someone, then glance down at his instruments, whereupon the camera also glances down to let you see what he is talking about, remember how much time and planning and money it took to let you glance at the instrument board. This will help to show why motion picture theaters sell popcorn to break even — and why science fiction pictures are not made every day. Realism is confoundedly expensive.

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Nor did the costs and the headaches with the control room stop there. As every reader of *Astounding* knows, when a rocket ship is not blasting, everything in it floats free — "free fall." Men float around — which meant piano wires inside that claustrophobic little closet. It was necessary at one point to show a man floating out from his acceleration couch and into the center of the room.

Very well; unbolt a panel to let in the wires. Wups! While a spaceship in space has no "up" or "down," sound stage three on Las Palmas Avenue in Hollywood certainly does have; supporting wires must run vertically — see Isaac Newton. To float the man out of the tight little space he was in would require the wires to turn a corner. Now we needed a Hindu fakir capable of the Indian rope trick.

The special effects man, Lee Zavitz, has been doing impossible tricks for years. He turned the entire set, tons of steel, on its side and pulled the actor out in what would normally be a horizontal direction. Easy!

So easy that the art department had to design, double gimbals capable of housing the entire set, engineer it, have it built of structural steel, have it assembled inside a sound stage since it was too big to go through the truck doors. Machinery had to be designed and installed to turn the unwieldy thing. Nothing like it had ever been seen in Hollywood, but it did enable a man to float out from a confined space and, later, to walk all around the sides of the control room with "magnetic" boots.

This double gimbals rig, three stories high, put the control room set high in the air, so the carpenters had to build platforms around it and the camera had to be mounted on a giant boom — one so huge, so fancy, and so expensive that Cecil B. de Mule came over to inspect it. The camera itself had to be mounted in gimbals before it was placed on the boom, so that it might turn with the set — or the other way, for some special effects. This meant removing its soundproof blimp, which meant dubbing the sound track.

("Who cares? It's only money." Don't say that in the presence of the business manager, he's not feeling well.)

This was not the end of the control room tricks. Some of the dodges were obvious, such as making dial needles go around, lights blink on and off, television and radar screens light up — obvious, but tedious and sometimes difficult. Producing the effect of a ship blasting off at six gravities requires something more than sound track of a rocket blast, as the men each weigh over a thousand pounds during blast. Lee Zavitz and his crew built large inflated bladders into each acceleration couch. Whenever the jet was "fired" these bladders would be suddenly deflated and the actors would be "crushed" down into their cushions.

A thousand pounds weight compresses the man as well as his mattress, which will show, of course, in his features. The makeup man fitted each actor with a thin membrane, glued to his face, to which a yoke could be rigged back of his neck. From the yoke a lever sequence reaching out of the scene permitted the man's features to be drawn back by the "terrible" acceleration. Part of what you see is acting by some fine actors, Dick Wesson, Warner Anderson, Tom Powers, John Archer, part was a Rube Goldberg trick.

The air suddenly escaping from the bladders produced a sound like that of a mournful cow, thus requiring more dubbing of sound track. The air had to be returned to the bladders

with equal suddenness when the jet cut off, which required a compressed air system more complicated than that used by a service station.

The sets abounded in compressed air and hydraulic and electrical systems to make various gadgets work — to cycle the air lock doors, to rig out the exit ladder, to make the instrument board work — all designed by Zavitz. Lee Zavitz is the man who "burned Atlanta" in Gone With The Wind, forty acres of real fire, hundreds of actors and not a man hurt. I saw him stumped just once in this film, through no fault of his. He was controlling an explosion following a rocket crash. It was being done full size, out on the Mojave Desert, and the camera angle stretched over miles of real desert. From a jeep back of the camera Zavitz was cuing the special effects by radio. In the middle of the explosions the radio decided to blow a tube — and the action stopped, ruining an afternoon's work. We had to come back and do it over the next day, after a sleepless night of rebuilding by the special effects crew. Such things are why making motion pictures produces stomach ulcers but not boredom.

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The greatest single difficulty we encountered in trying to fake realistically the conditions of space flight was in producing the brilliant starry sky of empty space. In the first place nobody knows what stars look like out in space; it is not even known for sure whether twinkling takes place in the eye or in the atmosphere. There is plausible theory each way. In the second place the eye is incredibly more sensitive than is Technicolor film; the lights had to be brighter than stars to be picked up at all. In the third place, film, whether used at Palomar or in a Technicolor camera, reports a point light source as a circle of light, with diameter dependent on intensity. On that score alone we were whipped as to complete realism; there is no way to avoid the peculiarities inherent in an artificial optical system.

We fiddled around with several dodges and finally settled on automobile headlight bulbs. They can be burned white, if you don't mind burning out a few bulbs; they come in various brightnesses; and they give as near a point source of light as the emulsions can record — more so, in fact. We used nearly two thousand of them — strung on seventy thousand feet of wire.

But we got a red halation around the white lights. This resulted from the fact that Technicolor uses three films for the three primary colors. Two of them are back to back at the focal plane, but the red-sensitive emulsion is a gnat's whisker away, by one emulsion thickness. It had me stumped, but not the head gaffer. He covered each light with a green gelatin screen, a "gel," and the red halation was gone, leaving a satisfactory white light.

The gels melted down oftener than the bulbs burned out; we had to replace them each day at lunch hour and at "wrap up."

There was another acute problem of lighting on the lunar set. As we all know, sunlight on the Moon is the harshest of possible light, of great intensity and all from one direction. There is no blue sky overhead to diffuse the light and fill the shadows. We needed a sound-stage light which would. be as intense as that sunlight — a single light.

No such light has ever been developed.

During the war, I had a research project which called for the duplication of sunlight; I can state authoritatively that sunlight has not yet been duplicated. An arc light, screened by Pyrex, is the closest thing to it yet known — but the movies already use arc lights in great numbers, and the largest arc light bulb, the "brute," is not nearly strong enough to light an entire sound stage with sunlight intensity — raw sunlight, beating down on the lunar set would have been equivalent to more than fifteen hundred horse power. There are no such arc lights.

We traced down several rumors of extremely intense lights. In each case we found either that the light was not sufficiently intense for an entire sound stage, or it was monochromatic — worse than useless for Technicolor.

We got around it by using great banks of brutes, all oriented the same way and screened to produce approximate parallelism. Even with the rafters loaded with the big lights almost past the safety point, it was necessary to use some cross lighting to fill gaps. The surface of

the Moon had some degree of "fill" in the shadows by reflection from cliff walls and the ground; it is probable that we were forced to fill too much. We used the best that contemporary engineering provides — and next time will gladly use an atomic-powered simulation of the Sun's atomic-powered light.

The simulation of raw sunlight was better in the scenes involving men in spacesuits outside the ship in space, as it was not necessary to illuminate an entire sound stage but only two or three human figures; a bank of brutes sufficed and no fill was needed, nor wanted, since there was no surrounding landscape to fill by reflection.

The effect was rather ghostly; the men were lighted as is the Moon in half phase, brilliantly on one side, totally unlighted and indistinguishable from the black sky itself on the other side.

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This scene in which men are outside the ship in space involved another special effect — the use of a compressed oxygen bottle as a makeshift rocket motor to rescue a man who has floated free of the ship. The energy stored by compressing gas in a large steel bottle is quite sufficient for the purpose. I checked theory by experiment; opening the valve wide on such a charged bottle gave me a firm shove. The method is the same as that used to propel a toy boat with a CO2 cartridge from a fizz water bottle — the basic rocket principle.

We had considered using a shotgun, since everyone is familiar with its kick, but we couldn't think of an excuse for taking a shotgun to the Moon. Then we considered using a Very pistol, which has a strong kick and which might well be taken to the Moon for signaling. But it did not look convincing and it involved great fire hazard in a sound stage. So we settled on the oxygen bottle, which looked impressive, would work, and would certainly be available in a spaceship.

However, since we were still on Las Palmas Avenue and not in space, it had to be a wire trick, with four men on wires, not to mention the oxygen bottle and several safety lines. That adds up to about thirty-six wires for the heavy objects and dozens of black threads for the safety lines — and all this spaghetti must not show. Each man had to have several "puppeteers" to handle him, by means of heavy welded pipe frames not unlike the cradles used by Tony Sarg for his marionettes, but strong enough for men, not dolls. These in turn had to be handled by block and tackle and overhead traveling cranes. Underneath all was a safety net just to reassure the actors and to keep Lee Zavitz from worrying; our safety factor on each rig was actually in excess of forty, as each wire had a breaking strength of eight hundred pounds. To top it off each man had to wear a cumbersome, welded iron, articulated harness under his spacesuit for attachment of wires. This was about as heavy and uncomfortable as. medieval armor.

The setups seemed to take forever. Actors would have to be up in the air on wires for as long as two hours just to shoot a few seconds of film. For ease in handling, the "oxygen bottle" was built of balsa wood and embedded in it was a small CO2 bottle of the fire extinguisher type. This produced another headache, as, after a few seconds of use, it would begin to produce carbon dioxide "snow," which fell straight down and ruined the illusion.

But the wires were our real headache. One member of the special effects crew did nothing all day long but trot around with a thirty-foot pole with a paint-soaked sponge on the end, trying to kill highlights on the wires. Usually he was successful, but we would never know until we saw it on the screen in the daily rushes. When he was not successful, we had to go back and do the whole tedious job over again.

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Most of creating the illusion of space travel lay not in such major efforts, but in constant attention to minor details. For example, the crew members are entering the air lock to go outside the ship in free fall. They are wearing "magnetic" boots, so we don't have to wire them at this point. Everything in the airlock is bolted down, so there is nothing to spoil the illusion of no up-and-down. Very well — "Quiet, everybody! Roll 'em!"

"Speed!" answers the sound man.

"Action!"

The actors go to the lockers in which their spacesuits are kept, open them — and the suits are hanging straight down, which puts us back on Las Palmas Avenue! "Hold it! Kill it! Where is Lee Zavitz?"

So the suits are hastily looped up with black thread into a satisfactory "floating" appearance, and we start over.

Such details are ordinarily the business of the script girl who can always be depended on to see to it that a burning cigarette laid down on Monday the third will be exactly the same length when it is picked up on Wednesday the nineteenth. But it is too much to expect a script girl to be a space flight expert.

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However, by the end of the picture, our script clerk, Cora Palmatier, could pick flaws in the most carefully constructed space yarn. In fact, everybody got into the act and many flaws were corrected not because I spotted them but through the alertness and helpfulness of others of the hundred-odd persons it takes to shoot a scene. Realism is compounded of minor details, most of them easy to handle if noticed. For example, we used a very simple dodge to simulate a Geiger counter — we used a real one.

A mass of background work went into the flight of the spaceship *Luna* which appears only indirectly on the screen. Save for the atomic-powered jet, a point which had to be assumed, the rest of the ship and its flight were planned as if the trip actually were to have been made. The mass ratio was correct for the assumed thrust and for what the ship was expected to do. The jet speed was consistent with the mass ratio. The trajectory times and distances were all carefully plotted, so that it was possible to refer to charts and tell just what angle the Earth or the Moon would subtend to the camera at any given instant in the story. This was based on a precise orbit — calculated, not by me, but by your old friend, Dr. Robert S. Richardson of Mount Wilson and Palomar Mountain.

None of these calculations appears on the screen but the results do. The *Luna* took off from Lucerne Valley in California on June 20th at ten minutes to four, zone eight time, with a half Moon overhead and the Sun just below the eastern horizon. It blasted for three minutes and fifty seconds and cut off at an altitude of eight hundred seven miles, at escape speed in a forty-six-hour orbit. Few of these data are given the audience — but what the audience sees out the ports is consistent with the above. The time at which they pass the speed of sound, the time at which they burst up into sunlight, the Bonestell backdrops of Los Angeles County and of the western part of the United States, all these things match up. Later, in the approach to the Moon, the same care was used.

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Since despite all wishful thinking we are still back on Las Pahmas Avenue, much of the effect of taking off from Earth, hurtling through space and landing on the Moon had to be done in miniature. George Pal was known for his "Puppetoons" before he started producing feature pictures; his staff is unquestionably the most skilled in the world in producing three-dimensional animation. John Abbott, director of animation, ate, slept, and dreamed the Moon for months to accomplish the few bits of animation necessary to fill the gaps in the live action. Abbott's work is successful only when it isn't noticed. I'll warrant that you won't notice it, save by logical deduction, i.e., since no one has been to the Moon as yet, the shots showing the approach for landing on the Moon must be animation — and they are. Again, in the early part of the picture you will see the *Luna* in Lucerne Valley of the Mojave Desert. You know that the ship is full size for you see men climbing around it, working on it, getting in the elevator of the Gantry crane and entering it — and it is full size; we trucked it in pieces to the desert and set it up there. Then you will see the Gantry crane pull away and the *Luna* blasts off for space.

That can't be full size; no one has ever done it.

Try to find the transition point. Even money says you pick a point either too late or too soon.

The *Luna* herself is one hundred fifty feet tall; the table top model of her and the miniature Gantry crane are watchmaker's dreams. The miniature floodlights mounted on the crane are the size of my little fingertip — and they work. Such animation is done by infinite patience and skill. Twenty-four separate planned and scaled setups are required for each second of animation on the screen. Five minutes of animation took longer to photograph than the eighty minutes of live action.

At one point it seemed that all this planning and effort would come to nothing; the powers-that-be decided that the story was too cold and called in a musical comedy writer to liven it up with — *sssh!* — sex. For a time we had a version of the script which included dude ranches, cowboys, guitars and hillbilly songs on the Moon, a trio of female hepsters singing into a mike, interiors of cocktail lounges, and more of the like, combined with pseudoscientific gimmicks which would have puzzled even Flash Gordon.

It was never shot. That was the wildest detour on the road to the Moon; the fact that the *Luna* got back into orbit can be attributed to the calm insistence of Irving Pichel. But it gives one a chilling notion of what we may expect from time to time.

Somehow, the day came when the last scene had shot and, despite Hollywood detours, we had made a motion picture of the first trip to the Moon. Irving Pichel said, "Print it!" for the last time, and we adjourned to celebrate at a bar the producer had set up in one end of the stage. I tried to assess my personal account sheet — it had cost me eighteen months' work, my peace of mind, and almost all of my remaining hair.

Nevertheless, when I saw the "rough cut" of the picture, it seemed to have been worth it. .

## The Witch's Daughters

*Have no truck with the*
*daughters of Lilith.*
*Pay no mind to the*
*redheaded creatures.*
*Man, be warned by their*
*sharp, white teeth;*
*Consider their skulls, and their*
*other queer features.*

*They're not of our tribe, with their*
*flame-colored hair;*
*They're no sib to us, with their*
*pale, white skins;*
*There's no soul behind those*
*wild green eyes*
*Man, when you meet one-*
*walk widdershins!*

*When they die, they pop,*
*like burst soap bubble*
*(Eight hundred years*
*is their usual span).*
*Loving such beings*
*leads only to trouble.*
*By Heaven, be warned,*
*you rash young man!*

**August 1946**

# The Bulletin Board

Our campus is not a giant, factory-size job with a particle accelerator and a two-hundred-man football squad, but it's chummy. The chummiest thing about it is the bulletin board in Old Main. You may find a stray glove fastened up with a thumbtack, or you can pick up a baby-sitting job if a married veteran doesn't beat you to it. Or you can buy a car cheap if you tow it from where it gave up. There are items like: "Will the person who removed a windbreaker from the Library please return same and receive a punch in the nose?"

But the main interest is the next four sections, "A-to-G," "H-to-L," "M-to-T," and "U-to-Z," for they are what we use in place — of the U.S. Postal "Service" at enormous saving in postage. Everybody inspects his section before class in the morning. If there's nothing for you, at least you can see who does get mail and sometimes from whom. You'll look again at lunch time and before going home. A person with a busy social life will check the board six or seven times.

Mine isn't that busy but I frequently find a note from Cliff. He knows I like to, so he indulges me. It's *fun* to get mail on the board.

There was a girl I used to run across because we were both in "H-to-L" — Gabrielle Lamont. I would say hello and she would say hello and there it stopped. Gabrielle was a sad one — not a total termite, but dampish. Her face had the usual features but she let them live their own lives, not even lipstick. She skinned her hair back and her clothes looked as if they had been bought in France. Not Paris — just France. There's a difference.

Which they probably were. Her father is in Modern Languages and he sent her three years to school in France. It did something. I don't think she ever had a date.

We both had eight o'clocks and she would check "H-to-L" every morning when I did and then go quietly away. There was never a note for her.

Until this one morning ... Georgia Lammers, who is purely carnivorous, took a note off the board as Gabrielle came up. I heard this soft little voice say, "Excuse me. That's mine." —

Georgia said, "Huh? Don't be silly!"

Gabrielle looked scared but she put out her hand. "Read the name, please. You've made a mistake."

Georgia snatched the note away. She is a junior and wouldn't bother to speak to me if Daddy weren't on the staff — but I'm .not afraid of her. "Do it," I insisted. "Let's see the name."

Georgia stuck the envelope in my face and snapped, "Read it yourself, snoopy!"

"Gabrielle Lamont," I read Out loud. "Hand it over, Georgia."

*"What?"* she yelped, and looked at it. Her cheeks got very red.

"Hand it over," I repeated.

"Well!" said Georgia. "Anybody can make a mistake!" She flung the note at Gabrielle and flounced off.

Gabrielle picked it up. "Thanks," she whispered.

"Usual Yellow Cab Service," I said. "A pleasure" — which it was. Georgia Lammers is popular in a cheap, plunging-neckline way, but not with me. She acts as if she had invented sex.

Gabrielle started getting mail every day — some in envelopes, some just with a thumbtack shoved through folds. I wondered who it was; but every time I saw Gabrielle she was alone. I decided it must be someone her father did not like so they had to use notes to arrange secret dates. I told Cliff so, but he said I had an uncontrolled romantic imagination.

Gabrielle got eleven notes that week and I got only four, all from Cliff. I pointed this out and he said I did not appreciate my blessings and he was going to ration me to three a week. Men are exasperating.

I came up one morning as Gabrielle was taking down a note; this time Georgia Lammers was there. As Gabrielle left I said sweetly, "Nothing for you, Georgia? Too bad. Or was it Gabrielle's turn to swipe *your* note?"

Georgia sniffed and went into the Registrar's office, where she is a part-time clerk. I thought no more about it until after five, when I was waiting in Old Main for Daddy, intending to ride home with him.

There was nothing on "H-To-L" for me, or for Gabrielle, or Georgia. Nobody was around so I sat down on the Senior Bench and rested my feet.

I jumped when I heard someone behind me, but it was only Gabrielle. She's a freshman, too, and anyhow she wouldn't tell. But I didn't sit down again — our senior committee thinks up fantastic

punishments for ignoring their sacred privileges.

A good thing I didn't — Georgia came out Of the office then. But she did not notice me; she went straight to "H-To-L" and unpinned a note. I thought: Maureen, your memory is slipping; there was nothing for her a minute ago.

Georgia turned and saw me. She flushed and said, "What are you staring at?"

"Sorry," I said. "I didn't think there was a note for you — I just looked at the board."

She started to flare up, then she put on a catty smile. "Want to read it?"

"Heavens, no!"

"Go ahead!" She shoved it at me. "It's *very* interesting."

Puzzled, I took it. It was a blank sheet, nothing but creases and thumbtack holes. "Somebody is playing jokes on you," I said.

"Not on *me*."

I turned it over. The address read: "Miss Gabrielle Lamont."

It finally soaked in that the address should have been "Georgia Lammers." Or should have been for Georgia to touch it. I said, "This note isn't yours. You have no right to it."

"What note?"

"*This* note."

"I don't see any note. I see a blank sheet of paper."

"But — Look, you thought it was a note to Gabrielle. And you took it down anyway."

Her smile got nastier. "No, I *knew* it wasn't a note. That's the point."

"Huh?"

She explained and I wanted to scratch her. Poor little Gabrielle had been sending notes to herself, just to get mail when everybody else did — and Georgia had caught on. Both girls had campus jobs which kept them late; Georgia had seen Gabrielle come in late a week earlier, look around, and pin up a note. Being a sneak, she had ducked out to find out to whom Gabrielle was writing — only to find that it was addressed to Gabrielle herself.

Poor Gabby! No wonder I had never seen her with anyone. There wasn't anyone.

Georgia licked her lips. "Isn't it a scream? That snip trying to make us think she's popular? I should write a real note on this — let her know that her public isn't fooled."

"Don't you dare!"

"Oh, don't be dull!" She pinned it up, putting the tack back in the same holes. "I'll let the joke ride until I think of something good."

I grabbed her arm. "Don't you touch her notes again or I'll —"

She shook me off. "You'll what? Tell her that you know her notes are phony? I can just see you!"

"I'll tell the Dean, that's what! I'll tell the Dean you've been opening Gabrielle's notes."

"Oh, yes? You looked at it, too."

"But you handed it to me!"

"Did I? My word against yours, sweetie pie."

"But —"

"And if you talk, the whole campus will know about Gabrielle's fake notes. Think it over." She marched off.

I was so quiet on the way home that Daddy said, "Smatter, Puddin'? Flunk a quiz?"

I assured him -that my academic status was satisfactory. "Then why the mourning?"

Before Daddy let me register he had warned me that the First Law of the Jungle for a professor's child was not to be a pipeline to the faculty. "But, Daddy, you're a professor."

"Student stuff, eh? Better sweat it out alone. Good. luck."

I did not tell Mother either, because with Mother free speech is not just a theory. I did nothing but worry. Poor Gabrielle! She took her "note" down next morning, looking pleased — and I wanted to cry. Then I saw the smirk on Georgia Lammers' face and I felt like murder and mayhem. There was another "note" Friday and I wanted to shout to her not to touch it. I didn't dare. It was like a time bomb, watching Gabrielle's pitiful make believe and knowing that Georgia meant to wreck it as soon as she thought up something nasty enough.

I was in the Registrar's office Monday, not to see Georgia, though I couldn't avoid her, but because I am a freshman reporter for the Campus Crier. One of my chores is getting up the "Happy Birthday" column. I thumbed through the files, noting dates from the coming Friday through the following Thursday. Gabrielle's name turned up for

Friday and I decided to send her a birthday card, via the bulletin board, so for once she would have *real* mail. Next I listed Bun Peterson's name; her birthday was the same as Gabrielle's. Bun is president of the Student Council and head cheerleader and honorary football captain; it seemed a shame she had to have Gabrielle's birthday as well. I decided to get Gabrielle a really *nice* card, with a hanky.

As I finished Georgia picked up my list and said, "Who's getting senile?

I said, "You are," and took it back.

She said, "Don't get too big for your beanie, freshman." She went on, "Going to the party for Bun Peterson?" — then added, "Oh, I forgot — it's upper classmen only."

I looked her in the eye. "A double choc malt against a used candy bar you aren't either!"

She didn't answer and I swaggered out.

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It was a busy week. Junior sprained his arm, Mother was away two days and I kept house, the cat had to be wormed, and I typed a term paper for Cliff. I didn't think about Gabrielle until late Friday when I stopped by the board on the chance that there might be a note from Cliff. There wasn't, but there was another of Gabrielle's notes, in an envelope with her name typed. I realized with a shock that I had forgotten her birthday card.

I was wondering whether to get one and let her find it Monday, when I heard a *pssst*! It was Georgia Lammers, motioning me to come to the office. Curiosity got me; I went.

She pulled me inside; there was no one else in the outer office. "Keep back," — she whispered. "If she sees anyone, she may not stop. She's due now — it's after five."

I shook her off. "Who?"

"Gabrielle, of course. Shut up!"

"Huh?" I said. "She's already been there. Her 'note' for Monday is up."

"A lot you know! Hush!" She crowded me into the corner, then peeked out. —

"Quit shoving!" I said and looked out.

Gabrielle was pinning something up, her back to us. She saw the

envelope with her name, took it down, and hurried away. —

I turned to Georgia. "If you've monkeyed with one of her notes, I *will* go to the Dean."

"Go ahead — see how far it gets you."

"Did you touch that note?"

"Sure I did — I wrote it. What's wrong with that?" She had me; anybody can send anyone a note. "Well, what did you say?"

"What business is it of yours? Still," she went on, "I'll tell you. It's too good to keep." She dug a paper out of her purse. It was a typewritten rough draft, full of x-outs and inserts; it read:

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Dear Gabrielle,

Today is Bun Peterson's birthday — and we are giving her the finest surprise party this school has ever seen. We would like to invite everybody, but we can't — and you have been picked as one of the girls to represent the freshman class. We are gathering in groups and will descend on her in a body. Your group will meet at seven o'clock in the Snack Shoppe. Put on your best bib and tucker — and don't breathe a word to *anyone*!

The Committee

-

"It's a shabby trick," I said, "to invite her to another girl's party on her own birthday. You knew it was her birthday."

"What of it?"

"It's mean — but just like you. How did you get them to invite her? You aren't on the committee — are you?"

She stared, then laughed. "She's not invited to anything."

"Huh? You mean there's no party? But there *is*."

"Oh, sure, there's a party for Bun Peterson. But that little snip won't be there. That's the joke."

It finally sank in. Gabrielle would go to the Snack Shoppe and wait — and wait — and wait — while the party she thought she had been invited to went on without her. "That strikes you as funny?" I said.

"That's just the beginning," this Lammers person answered. "About eight-thirty, when she is beginning to wonder 'Wha Hoppen?' a messenger will bring another note. It will be blank paper, just like those she sends to herself — then she'll *know*." She giggled and wet

her lips. "The little fake will have her comeuppance."

I started after her and she ducked back of the counter. "You're not allowed back here!" she yelped.

I stopped. "You'll have to come out some time. Then we'll find Gabrielle and you will tell her the truth — all of it!"

"Tell her yourself!" she snapped. Two boys drifted in and the Registrar came out of the inner office and Georgia became briskly official. I left.

Cliff was waiting at "H-To-L"; I was never so glad to see him.

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"Well," Cliff said a bit later, "phone her. Tell her she's~ been had and not to go to the Snack Shoppe."

"But, Cliff, I *can't*! That would be almost as cruel as the way Georgia planned it. Look — can't you get somebody to take her to Bun's party?"Cliff wrinkled his forehead. "I don't see how." "Cliff, you've got to!"

"Puddin', today is Gabrielle's birthday, too. Right?"

"Yes, yes — that's what makes it so mean."

"You don't want to send her to Bun's party. What we do is give her a surprise party of her own. Simple."

I stared with open-mouthed adoration. "Cliff — you're a genius."

"No," he — said modestly, "just highly intelligent and with a heart of gold. Let's get busy, chica."

First I phoned Mother. She said, "Tonight, Maureen? I like to entertain your friends but —" I cut in with a quick up-to-date. Presently she said, "I'll check the deep freeze. Sommers Market may still be open. How about turkey legs and creamed mushrooms on toast?"

"And ice cream," I added. "Birthday parties need ice cream."

"But the cake? I'm short on time."

"Uh, we'll get the cake."

As I hung up Cliff came out of the other booth. "I got the Downbeat Campus Combo," he announced.

"Oh, Cliff — an *orchestra*!"

"If you can call those refugees from a juke box that."

"But how will we pay for it?"

"Don't ask — it was a promotion. They bid on Bun's party and got left, So they listened to reason. But I'm not doing well on guests, baby."

"You called your house?"

"Yes. A lot of the boys have other plans."

"You call again and tell those free loaders that they will never eat another Dagwood in my house if they are not *there*, on *time*, and each with a present. No excuses. This is total war."

"Aye aye, sir."

We went to Helen Hunt's Tasty Pastry Shoppe. Mr. Helen Hunt was just closing but he let us in. No birthday cake ... not a baker in the place until four the next morning — sorry. I spotted a three-tier wedding cake. "Is that a prop?"

"Frankly, that's a disappointment. My wife and I each entered the same order."

"You're stuck with it?"

"Oh, we may get a wedding cake order unexpectedly."

"Eight dollars," I said.

He looked at the cake. "Ten dollars" — then added, "Cash."

I looked at Cliff. He looked at me. I opened my purse and he got out his wallet. We had six fifty-seven. Mr. Helen Hunt stared at the ceiling. Cliff sighed and unpinned his fraternity pin from my blouse, handed it over, and Mrs. Helen Hunt dropped it into the cash register.

He took the little bride-and-groom off the cake, set candles around each tier, then fetched an icing gun. "What name?"

"Gabrielle," I replied. "No, make it 'Gabby' — G, A, double-B, Y."

I called Madame O'Toole from there. Madame bends hair for half the girls on the campus. She lives back of her beauty salon and agreed to be panting and ready at seven-fifteen. Fast driving let Cliff drop me at six-ten. Junior was stringing Christmas tree lights across the front porch and Daddy was moving furniture. Mother was swooshing like a restless tornado, a smudge of dirt on her cheek. I kissed Daddy but Mother wouldn't hold still.

I made three calls while the tub was filling, then dunked, put my face on, and inserted myself into my almost-strapless formal. Cliff honked at five minutes to seven; he looked swell in a tuxedo a little too small and the darling had two gardenia corsages, one for me and one for Gabrielle. We roared away toward the Snack Shoppe, hitting

on all three.

We got there at seven-fifteen. I looked in and saw Gabrielle at a rear table, looking forlorn and nursing a half-empty coke. She was in a long dress which was not too bad but she, had tried to use makeup and did not know how. Her lipstick was smeared, crooked, and the wrong color, and she had done awful things with rouge and powder. Underneath she was scared green.

I walked in. "Hello, Gabby."

She tried to smile. "Oh — hello, Maureen."

"Ready to go? We're from the committee."

"Uh — I don't know. I don't feel well. I'd better go home."

"Nonsense! Come on — we'll be late." We got on each side and hustled her out to Cliff's open-air special.

"Where is the party?" Gabrielle asked nervously.

"Don't be nosy. It's a surprise." Which it was.

Cliff pulled up at Madame O'Toole's before she could ask more questions. Gabrielle looked puzzled but her will to resist was gone. Inside I said to Madame O'Toole, "You have seventeen minutes."

Madame looked her over like a pile of wet clay. "Two hours is what I need."

"Twenty minutes," I conceded. "Can you do it?" Over the phone I had told her that she had to create Cleopatra herself, starting from zip.

She pursed her lips and looked the kid over again. "We'll see. Come along, child."

Gabrielle looked dazed. "But Maureen —"

"Hush," I said firmly. "Do exactly what — Madame tells you."

Madame led her away. While we waited Cliff called the Deke house and the senior dorm and stirred out five more men and two couples. It was thirty minutes before they reappeared — and I nearly fainted. —

Madame was wasted here — She belonged at the court of Louis Quinze.

And so did Gabrielle. —

At first I thought she was wearing no makeup. Then I — saw that it had been put on so skillfully that you thought it had grown there. Her eyes were eight times as big as they had been and looked like pools of secret sorrow if you know, a woman who has *lived*. Her hair was still

brushed straight back but Madame had done it over. What had been a bun was now a chignon — "bun" wasn't the word. Her cheekbones were higher, too. And Madame had done. something to the dress it clung more and seemed more low-cut. Riding high on her shoulder was the corsage and her skin blended into the petals.

Instead of the beads she had been wearing there was a single strand of pearls -resting where pearls love to rest. They must have been Madame's very own. They looked real.

Cliff gasped so I poked him to remind him not to touch. Gabrielle smiled timidly. "Do I look all right?"

I said, "Sister, Conover would shoot Powers for your contract. Madame, you're wonderful! Let's go; kids. We're late."

You can't talk when Cliff is driving, which was good. We got there at twenty past eight; our block was jammed and our house stood -out in colored lights. Junior was on guard; he ducked inside.

Cliff took our coats I gave Gabrielle a shove and said, "Go on in."

As she appeared in the living room the Downbeat boys bit it and they all sang:

-

*"Happy birthday, dear Gabby!*

*"Happy birthday to you!"*

-

And then I was almost sorry, for the poor baby covered her face and sobbed.

And so did I. Everybody began laughing and talking and shouting and the Downbeat Combo went into dance music, not good but solid, and I knew the party would do. Mother and I smuggled Gabby upstairs and I fixed my face and Mother shook Gabby and told her to stop crying. Gabby stopped and Mother did a perfect job fixing what damage had been done. I didn't know Mother owned mascara but I am always finding Out new things about Mother.

So we went back down. Cliff showed up with a strange man and said, "Mademoiselle Lamont, permettez-moi de vous presenter M'sieur Jean Allard," which was more French than I knew he had. —

Jean Allard was an exchange student that one of the boys had brought along. He was slender and dark and he fastened himself to Gabby-his English was spotty and *here* was a woman that spoke his language...that and Madame O'Toole's handiwork. Be had competition;

most of the stags seemed to want to get close to the new-model Gabby.

I sighed with relief and slipped out to the kitchen, being suddenly aware that I had missed dinner, a disaster for one of my metabolism. Daddy was there in an apron; he gave me a turkey leg. I ate that and a few other things that wouldn't fit on the plates.

Then I went back and danced with Cliff and some of the stags that had gotten crowded out around Gabby. When the orchestra took ten it turned Out that Johnny Allard could play piano, and he and Gabby sang French songs-the kind that sound naughty, -what with the eye-rolling, but probably aren't. Then we all sang *Alouette* which is more my speed.

Gabby was gaining a reputation as a woman of the world. I heard one ex-Boy Scout say, "You've *really* seen the Folies Bergère?"

Gabby looked puzzled and said, "Why not?"

He said, "Gee!" while his eyebrows crowded his scalp.

Finally we brought out the cake and everybody sang "Happy Birthday" again and Mother had to -repair Gabby's face a second time. But by now Gabby could have washed her face and it wouldn't have mattered.

Professor Lamont arrived while we were killing the ice cream and cake — Daddy's doing. He and Jean Allard talked French, then I heard Jean ask him, in schoolbook English, for permission to call on his daughter. Doctor Lamont agreed in the same stilted fashion.

I blinked — Cliff never asked Daddy; he just started eating at our house, off and on.

Around midnight Doctor Lamont took his daughter home, loaded with swag. At the last minute I remembered to run upstairs and wrap up a new pair of nylons that would never fit Gabby but she could exchange them. So Gabby cried again and clung to me and got incoherent in two languages and I cried some, too. Finally everybody left and Cliff and Daddy and I tidied up the place, sort of. When I hit the bed, I died.

Cliff showed up next morning. We gloated over the party, at least I did. Presently he said, "What about Georgia?"

I said, "Huh?"

He said, "You can't leave it at this. It ought to be poisoned needles, or boiling lava, but the police are narrow-minded."

"Any ideas?"

He pulled out the bill for the cake. "I'd like to see her pay this."

"So would I! But how in the world?"

Cliff explained, then we composed the letter together, like this: —

-

Dear Georgia,

Yesterday was Gabrielle Lamont's — birthday-and we gave her the finest party this school has ever seen. Too bad you were hanging around the Snack Shoppe while the fun was going on. But we know you would like to give her a present anyway-you can still pay for the cake.

Put on your best bib and tucker and trot around to Helen Hunt's. It was a surprise party, so don't breathe a word to *anyone*! (Nor shall we.)

— The Committee

P.S. On second thought it will be-more fun if you *don't* pay for the cake!

-

It wasn't anonymous; the bill had our names on it and we pinned it to the letter. I bet Cliff two hamburgers that she wouldn't knuckle under. I was wrong. Half an hour after it was delivered Helen Hunt phoned to say that Cliff could have his pin back, the mortgage was lifted.

-

Monday morning I was at the board earlier than either Cliff or Gabby. Gabby's poor little "note" was still pinned up, where she had put it Friday. I wondered what she would do; start pretending all over again? —

I spotted her coming up the steps, walking alone and lonely, same as always-and again I wondered if it had done any good. Then somebody shouted, "Hey, Gabby! Wait a minute." She stopped and two boys joined her.

I watched her and then Cliff growled at my back, "Why the sniffles? Got a cold?"

I said, "Oh, Cliff! Give me your hanky and don't ask silly questions."

# Poor Daddy

Mother is too busy for anything, except that she is always taking on more jobs. She can do them, too, and it never matters whether they're something that Grandmother would call "ladylike."

She practically built our new house — only it wasn't new when we moved into it. For about three months, turpentine flavor would show up in the butterscotch pudding, or Daddy would complain that he didn't mind not being able to use his electric razor while Mother was installing new wiring, but he *would* appreciate it if his other razor weren't used to skin insulation.

Mother wouldn't hear him; she'd be rebuilding the staircase, or something.

Eventually the house was finished, except for clearing out the garage so that the car could be kept inside, and covering the pipes in the new bathroom, and a few other things that Mother could do any day she had to wait for a pot roast to finish cooking. It left her with nothing to do, except teaching Sunday School and managing the Cornmunity Chest drive and seeing that Daddy changed his shirts and keeping up with her painting and the play she was writing.

Daddy suggested that she improve her mind, but Mother said nonsense, Daddy had all the mind the family needed. Daddy is fearfully learned about tribal customs and Yucatan culture and things like that. Besides, Mother pointed out that she had rerigged her. bookrack so that it would go on the vacuum cleaner as well as over the sink, so she was already improving her mind. What she needed was exercise.

Daddy invited her to go fishing, but Mother said it wasn't exercise the way he did it, practically urging the fish not to disturb him. Daddy said the fish got plenty of exercise and who was he to insist on all the benefits? Daddy talks that way because the freshmen laugh.

Anyhow, that's why we took up figure skating.

Not Daddy — just Mother and Junior and me. Daddy said he had tried skating once and he had weak ankles, just go ahead and enjoy ourselves. He took out a family accident insurance policy and forgot the matter.

I liked figure skating , all but getting your pants wet if you take a

tumble. I know why they call that other sort "dry" ice; the kind you skate on isn't. Junior liked it because he could go slamming around, bumping into people and being a nuisance to his elders. But Mother took to it as if all her life had been preparation for this consummation.

She never was good at school figures; Mother's style can't be limited to a little patch of ice barely big enough for a figure eight. But dancing she loved — she was doing tangoes and waltzes and beginning to boss things when our club organized an ice carnival, while I was still struggling with the Mohawk in the fourteen-step. The fourteen-step is the first dance you learn; I was hopelessly outclassed by Mother, not a desirable thing, except that; as a result of my difficulties with the Mohawk, Cliff came into my life.

A Mohawk is not an Indian and neither is Cliff. A Mohawk is a transition from front to back while passing from one edge on one foot to a similar edge on the other foot. That doesn't seem clear-anyhow you skate forward as fast as you can and suddenly turn and skate backward. All this while your partner has his feet crossed, and you are in a close embrace, and while turning a corner that you can't see. It would help to dislocate both knees. In fact, you can hardly avoid it. I explained it to Daddy and he said it didn't sound practical, except possibly in a wheelchair.

You may wonder why I persisted. Well, in the first place it was my battle with the Mohawk that caused Cliff to introduce himself and start teaching me. That was good. In the second place they say that love will cause a man to put up with a poor skating partner for ninety days — maybe six months, if it's true love. That was bad. The way I figured it I had a maximum of half a year in which to master that Mohawk — or put Cliff out of my life and devote myself to good works.

That Mohawk nearly stopped me, but Cliff was very patient. He said the trouble might be the fit of my boots, and got me some heel liners. I finally learned it after a fashion, and Cliff went on to teach me other things.

The Mohawk never bothered Mother. She was past it and learning the cut-off in the fox trot, which is even trickier, and zipping through seven or eight other dance patterns. Mother never actually danced well, but she could dance and she could hold up her partner in a pinch. Mother is little but tough. I am more a Junoesque type. She developed a bouncy style of her own. Our club professional gave up trying to smooth it out and let her learn new things as fast as she wanted to, which was just as well.

In March Daddy came to see the carnival and the dance that

followed. He complimented Mother on the costumes, which she had made, of course. But the dancing afterward gave him pause. Mother is very popular on the ice — even Cliff would rather dance with her than with me. I suppose that it should have made Daddy proud to see how the mother of his progeny was sought after; instead he looked thoughtful. He remarked that the tango should be restricted to married couples, or at least considered tantamount to an engagement.

Mother said pish and tush .

Daddy dropped in at the rink and watched the dancing once or twice after that. When school closed he left on a long fishing trip and didn't urge Mother to go along, which worried me, but Mother said he was accepting the universe. Usually Daddy makes the universe accept him. It seemed odd. The importance of a stable family background for the adolescent is emphasized in all the textbooks, as well as in the more interesting works on psychology Daddy means to keep locked up; I decided I had better keep an eye on things.

Daddy sent back cards postmarked Green Mountain Falls, Colorado, and some fish packed in ice.

When he got back he showed an interest in skating and borrowed Mother's Primer of Figure Skating. One evening when Mother, Junior, and I returned from the rink, Daddy put down the book and announced, "Martha, I have concluded that figure skating is fundamentally simple."

Mother should have been wary. She said, "Yes, dear? That's nice," and sailed out to throw dinner together.

"Yes," he said, following her. "It is simple physics, primarily the conservation of angular momentum, plus laws relating to the acquirement of reflex patterns; Figure skating may be learned rapidly by analyzing each move, then being sure to do it correctly the first time. Anyone of adequate-mentality should acquire the art in a short time."

"Hmm," said Mother. "I suppose you can apply these principles you've discovered?"

"Certainly," Daddy told her. "Skating is ordinarily taken up by the very young, whose habits of mental discipline are not formed. Or, conversely, by older people — but casually rather than systematically. I wish I had time to demonstrate it. However, the principles are clear from my analysis."

And that is why we all went to the rink the following Friday.

Mother started to pick out skates for Daddy. He waved her out of

the skate shop. "I shall do this methodically," he said. "I'll see you all on the ice."

I've never seen Mother in such a dither. "Your father is such a child! Maureen, you help him when he steps on the ice — the mood he's in, he won't let me. Oh, dear! I wonder if I still know how to apply a traction splint?"

"Probably be his head, rather than his leg," I offered. It didn't console her.

I didn't get a chance to help, as he was met at the ice by Miss Swenson, our club professional. "I arranged by telephone for Miss Swenson's help, my dear," he said to Mother. With that he stepped down on his toe picks, just as it says in the book .

Miss Swenson flashed Mother a smile and said, "Don't worry, I'll take care of him."

Mother said, "Who said I was worried?" and skittered off. She looked mad.

Miss Swenson towed Daddy to the pen where the bunnies practice. Then she said sweetly to me, "Now, Maureen, go skate somewhere else. Just pretend your father isn't here at all." I can take a hint; I went back to my patch and practiced inside edges.

Mother joined me. "Is he all right?" she asked.

"Probably. Miss Swenson hardly ever maims them."

"I'll just skate down and see how they're making out."

"I wouldn't," I told her. "I got chased out. They don't want an audience."

Mother said, "They'll be too busy to notice me." She came back with her cheeks red and started doing loops like mad.

Presently the music started for dancing. Mother had ducked into the girls' room to restore her makeup and her confidence. The first dance was a fourteen-step.

Dad and Miss Swenson came out onto the dance floor. They actually lined up to start the dance with the others.

I closed both eyes. Dear heaven, I thought, don't let him do it. Oh, don't let him fall — they'll cut my poor Daddy to ribbons. The fourteen-step is awfully fast. If you fall down, it's just like being caught by traffic lights.

Finally I opened my eyes to see if I were going to be an orphan. Cliff skated up and said, "Skate this one, Puddin'?"

I said I might never skate again and tried to pick out Daddy. Finally I saw him, away down the ice. He was in the four-beat roll that carries you down the rink, and he was actually doing it — or sort of. I've seen circus bears that skated better, but he was still on his skates. I decided that Miss Swenson must be stronger than I'd thought.

There was stilt the corner to turn and it was coming at him. The ladies' Mohawk may forever remain my bugaboo, but the men's Mohawk is no slouch, and it comes right at the turn. I got ready to identify the body.

Then he was past it and Miss Swenson was faking to cover up the extra steps he took. He turned the corner without even missing the beat. I wanted to cheer but my throat was dry.

Mother showed up. "Where's your father, .Maureen?" she demanded.

I pointed. They were swooping down the ice, and Daddy's roll was deeper this time.

It was the only time I've seen Mother start to faint. She managed to control it, but I had to grab her to keep her from sitting down suddenly on some very wet.ice . The music stopped and Daddy skated up alone. "My dear," he said to Mother, "this next is a tango. Would you essay it with me?"

Mother grabbed him. "Charles!" she shrilled. "Get off this ice! You'll kill yourself — I don't know how that woman could take you out in that traffic!"

"Quiet, my dear," said Daddy. "I am unhurt. Will you tango with me, or shall I dance with my instructor?"

"You can't tango!"

"I have studied the pattern carefully. I expect to retain a semblance of the moves."

They tangoed. It wasn't good, but Daddy had not been woofing about memorizing the pattern. My own wasn't much better — I kept changing sides with Cliff at the wrong times, trying to watch.

We rode home in silence. I got Junior aside when we got home. "What did you think of Daddy's skating?"I asked .

"Huh? Dad's a terrible skater."

"Weren't you amazed that he could skate at all?"

"Why?" was all I could get out of him.

I didn't discuss it with Daddy until three days later, because it took

that long to collect facts. I tackled him privately. "Daddy," I said, "something is worrying me."

"Well, Puddin'? Can I help?"

"Perhaps, since you are more experienced than I."

"Easy now! What are you leading up to?"

"Well, what would you think of a person who deceived someone?"

"It depends on the circumstances. For example, deception is justifiable around Christmas and before birthdays."

"Oh." I considered. "I don't know what category this belongs in."

"Well, spill it."

"Very well, then. It says in your logic text that when apparent facts lead to contradictions, each alleged fact should be tested. I have reason to believe that the sort of fish you sent home are not found in the lake at Green Mountain Falls."

"Who said they were? There are other places to fish."

"I suppose so. It occurred to me that both Green Mountain Falls and Broadmoor are suburbs of Colorado Springs."

"Go on."

"Broadmoor reminded me of the figure-skating school at the ice palace there each summer."

"Yes?"

"One conjecture led to another. I remembered that Miss Swenson teaches at the rink over in Centerville mornings, and that you don't have any morning classes at present."

"Hmm. . . Did Miss Swenson show any interest in your conjectures?"

"Oh, Miss Swenson is incorruptible! But, Daddy, George at the skate shop is not so difficult. Cliff got him to recall that some skates were shipped to him from Colorado Springs recently. For five dollars he thinks he could remember whose they were."

"Tell Cliff not to waste his money. What is your object in this snooping, young lady? Not something your mother thought of?"

"Oh, no, Daddy! Mother is baffled."

"Then why —"

"At first it was just curiosity. Since then, however —"

"Yes?"

"After I had the facts, I still couldn't see the reason. Why the mystery? Come clean, Daddy."

He stopped to load his pipe. "Put yourself in my place, Puddin'. Suppose the girl of your dreams was being chased after by a bunch of young bucks who could cut didos on the ice. What would you do?"

"Why, uh — I'd learn to skate," I answered automatically. I was dazed. Imagine it! Romance — jealousy! — at Daddy's age!

"Yes, but not in public. It wouldn't do to go stumbling around with your mother hovering over me and explaining how I wasn't the athletic type and wasn't it brave of me? I had to impress her."

"Oh. I see your point, Daddy." I suppose that should have settled it, but I had one more thing in mind. "Oh, Daddy —"

"Yes, Puddin'?"

"I'm glad you comprehend the crucial symbolic importance skating can have in relationships between the sexes, because then you will understand —" I stopped. I couldn't tell him anything about Cliff because Cliff doesn't know yet that he's going to marry me. Men are so complicated.

Daddy raised his brows. "Understand what, Puddin'? And where did you get all those big words? Not from me, I trust."

"No — I mean, yes." I hesitated; this was going to be touchy. "Well, to get to the point, Daddy, during my investigations I examined your skates. They're . awfully nice. If I had Stanzione boots and Olympiad blades like yours, I might make marvelously fast progress myself. Of course, I'd keep your grisly secret," I added hastily.

"Blackmail!"Daddy said. " Puddin', men have been shot at sunrise for less."

"I suppose so, Daddy."

"You are almost too big to spank."

"I'm glad you think so, Daddy. It makes everything simpler."

"I said almost. However, you're getting older and have heavier expenses. Suppose I raise your allowance. Then, if you need skates, I'll advance the cash and deduct it.!"

"This is a private arrangement, Daddy?"

He shook his head. "Say anything you like. You will have to judge moral problems for yourself."

Daddy is such a lamb.

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# The Discovery of the Future

## Guest Of Honor Speech At The Third World Science Fiction Convention — Denver, 1941

Here in my hand is the manuscript of a speech. If it works out anything like the synopses I have used, this speech will still be left when I get through.

Before I start, I want to mention an idea that might be fun. It was an innovation in political speaking introduced in California by Upton Sinclair that raised Cain with the ordinary run of political speakers: answering questions from the platform. But I want to put one reservation on it, and that is that questions should be in writing, with names signed, so we can read them into the mike so that I can have clearly in mind what the questions are.

During the course of the last day or so, I have gathered the impression that quite a number of people are interested in the background of my stories; and; in some cases, in my social and political ideas, economic ideas, etc. — some of which, but not all, shows in my stories. Some of them have evidenced an interest in my own personal background. So, if the question comes along, I will do my best to answer it, perhaps dodging the embarrassing ones a little.

To get to the talk itself: THE DISCOVERY OF THE FUTURE. I was told that there was no time limit, so I assumed that he wanted my usual three hour speech. Or, perhaps, we can just keep going until the hall is cleared.

Forry [Ackerman] told you that I have been reading science fiction for a longtime. I have. I have been reading it as long as I could get hold of it, and I probably experienced much the same process most of you did: parental disapproval, those funny looks you get from friends, for reading "that kind of junk."

We here, the science fiction fans, are the lunatic fringe! We are the crazy fools who read that kind of stuff — who read those magazines with the outlandish machines and animals on the covers. You leave one around loose in your home and a friend will pick it up. Those who are not fans ask you if you really read that stuff, and from then on they look at you with suspicion.

Why do we do it? I think I know. This is an opinion, but it is probably why we like science fiction. It is not just for the adventure of the story itself — you can find that in other types of stories. To my mind it is because science fiction has as its strongest factor the single thing that separates the human race from other animals — I refer to a quality which has been termed "time-binding." With a hyphen. It's a term that may not have come to your attention. It is a technical term invented by Alfred Korzybski, and it refers to the fact that the human animal lives not only in the present, but also in the past and the future.

The human animal differs from all other animals *only* in this one respect. The definition includes both reading and writing. That is the primary technique whereby we are able to make records, to gather data and to look into the future. Other things we do that we think of as making us humans rather than animals — some animals have done at sometime. They form governments. They invent machines. Some animals even use money. I have not seen them doing it, but I have heard reports that I believe to be credible. But time-bind they do not do, to anything like the extent that the human race does.

Time-binding consists of making use of the multitudinous records of the past that we have. On the basis of those records, the data we have collected directly and the data that we get from others by means of time-binding techniques, including reading and writing, we are able to plan our future conduct. It means that we have lived mentally in the past and in the future, as well as in the present. That is certainly true of science fiction fans.

I like the term Future Fiction that Charlie Hornig gave it. It seems to me a little broader than Science Fiction because most of these stories are concerned with the future — what will happen.

In taking the future into account, trying to predict what it will be, and trying to make your plans accordingly, you are time-binding. The child-like person lives from day to day. The adult tries to plan for a year or two at least. Statesmen try to plan for perhaps twenty years or more. There are a few institutions which plan for longer than the lives of men, as for example, the Smithsonian Institution and the Catholic Church, that think not in terms of lifetimes, but in centuries. They make their plans that far ahead, and to some extent, make them work out.

Science fiction fans differ from most of the rest of the race by thinking in terms of racial magnitudes — not even centuries, but thousands of years. Stapledon thinks in terms of ... how many years? How far does his time scale go? I don't know: the figures mean

nothing to me,

That is what science fiction consists of trying to figure out from the past and from the present what the future may be. In that we are behaving like human beings.

Now, all human beings time-bind to some extent when they try to discover the future. But most human beings — those who laugh at us for reading science fiction — time-bind, make their plans, make their predictions, only within the limits of their personal affairs. In that respect, they may try to predict for a year or two, make plans, even try to predict for their entire lifetimes, but they rarely try to predict in terms of the culture in which they live. In fact, most people, as compared with science fiction fans, have no conception whatsoever of the fact that the culture they live in *does* change, that it *can* change. Even though they may believe it with the top of their minds, they don't believe it way back in the thalamus, in their emotions.

Our grandfathers thought the horse could never be replaced by the auto. Four years after the Wright brothers first flew, they were still trying to get the War Department to come out to look at the airplane. And when one Major General did take a look at an airplane flying, he remarked that it was a very interesting scientific toy, but, of course, it had no possible military application! That was just a short time ago, a very short time.

You will hear that sort of thing around you all the time. I made use, a while ago, of a quotation I would like to use again, from 0. B. Shaw. Referring to Brittanicus in *Caesar and Cleopatra,* he said, "he is an outlander and a barbarian and he believes that the customs of his tribe are the laws of nature." That is what you are up against when you try to get most people to read science fiction. That is why they think you are crazy, because they believe that the customs of their tribe are the laws of nature, immutable and unchanging. They do not believe in changes.

Phrases like "There'll always be an England" are pleasant and inspiring at the present time, but *we* know better. There won't always be an England, nor a Germany, nor a United States, a Baptist Church, nor monogamy, nor the Democratic Party, nor the modesty taboo, nor the superiority of the white race, nor airplanes. Nor automobiles. They will go. They will be gone — we'll see them go. Any custom, institution, belief, or social structure that we see around us today will change, will pass, and most of those we will *see* change and pass.

In science fiction, we try to envision what those changes might be. Our guesses are usually wrong; they are almost certain to be wrong. Some men, with a greater grasp on data than others, can do

remarkably well. H. G. Wells, who probably knows more (on the order of ten times as much, or perhaps higher) than most science fiction writers, has been remarkably successful in some of his predictions. Most of us aren't that lucky;

I do not expect my so-called *History of the Future* to come to pass. I think some of the trends in it may show up, but I do not think that my factual predictions as such are going to come to pass, even in their broad outlines.

You speak of this sort of thing to an ordinary man — tell him that things are going to change — he will admit it, but he does not believe it at all. He believes it just with the top of his mind. He believes in "progress." He thinks things will get a little bit bigger, and louder, and brighter, a few more neon signs. *But he does not believe that any actual change in the basic nature of the culture in which he lives, or its technology, will take place.*

Airplanes he thinks are all right, but those crazy rocket ship things! Why, a rocket ship couldn't possibly fly. It hasn't got anything to PUSH on. That is the way he feels about it.

There will never be any rocket ships. That is all right for Buck Rogers in the funny papers. He does not believe that there could be rocket ships, nor does he believe that there will be things that will make rockets look like primitive gadgets that even the wildest of the science fiction writers have not been able to guess or think about. Rocket ships are about as far as I am willing to go because I have not got data enough to think about, to make a reasonable guess about the other forms of transportation or gadgets we may have.

But that same man did not believe in airplanes in 1910!

I have spoken primarily of mechanical changes because they are much easier to show, to point to, than the more subtle sociological changes, cultural changes, changes in our customs. Some of these can be pointed out. I would like to point out one of them right now. The word "syphilis" could not be used in public even as short a time as fifteen years ago.

Yet, as I used it here, I did not see any shock around the room — nobody minded it — even the *Ladies' Home Journal* runs articles on it. We are getting a little more civilized in that respect than we were twenty years ago. Our grandfathers considered that word indecent. They believed that things that were decent and indecent were subject to absolute rules, that they were laws of nature. The majority of people around us now believe that their criteria of decency and indecency are absolute, that they won't change, that there are some

things that are *right,* and some things that are *wrong.* They do not know enough about past history to be able to make any predictions about the future.

I could think of some rude words to use in that connection, words that are still rude now. I think it quite possible that twenty years from now on this same platform I could use those words and not produce any shock around the room.

For things *do* change. And words which we consider utterly indecent today may very possibly simply be used as tags, as terms with no emotional connotation to them, twenty years from now.

We happen to live in a period of sudden and drastic change in a good many of the things that happen to us. I think it is extremely important that we be prepared for that change and for that reason, I think that science fiction fans are better prepared to face the future than the ordinary run of people around them, because they believe in change.

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To that extent, I think that science fiction, even the corniest of it, even the most outlandish of it, no matter how badly it's written, has a distinct therapeutic value because *all* of it has as its primary postulate that the world *does* change. I cannot overemphasize the importance of that idea.

Unless you believe that, unless you are prepared for it — as I know all of you are — you can't retain your sanity these days. When a man makes predictions and they keep failing to come true, time and again, he goes insane, functionally insane. It has been proved in laboratories time and again. It has been proved with respect to men, but I'll give an illustration with respect to animals.

The well-known experiment was performed with rats, an experiment in which a rat was disappointed in his predictions time and again. He went crazy. It happens to work the same way with men. Things do not necessarily work the same way with animals as they do with men, but in this case, there is data to prove it. The inability to believe in change makes absolutely certain that your prediction will disappoint you. That does not apply to this group, but it does apply to a great many people.

For that reason, I believe we are in a period in which large portions of the human race will be in a condition of, if not insanity, at least un-sanity. We see that over a large portion of the world today. I think we have seen it crawling up on us for a number of years. In 1929 we had the market crash and people jumped out of the window

as a result of not being able to predict things which were perfectly obvious, written on the face of the culture, something that would happen.

The Depression came along, and the madhouses filled up again. Other only slightly less slaphappy individuals proceeded to be a bit unsane by concocting the most wildly unscientific schemes for making everybody rich by playing musical chairs.. Not quite crazy — they could still find their way around and take street cars and not get lost, but not quite sane either. That can lead, if it goes on long enough, to a condition of mass insanity that none of us is going to like.

Nevertheless, we science fictionists, I think, are better prepared for it than others. During a period of racial insanity, mass psychoses, hysteria, manic depression, paranoia, it is possible for a man who believes in change to hold on, to arrest his judgment, to go slow, to take a look at the facts, and not be badly hurt. Things will probably happen to us, very unpleasant indeed, we can't separate ourselves from the matrix in which we find ourselves. Nevertheless, WE stand a chance, for I am very much afraid that a great many people of the type who laugh at us for dealing with this stuff, will not be able to hang on.

The important thing is to hang on to your sanity, to preserve sanity while it happens — no matter what bad things happen to the world.. As individuals it may be difficult for us to do anything about it, even though all of us in our own ways, and according to our lights, are trying. But this series of wars that we find the world in now may go on for another five years, ten years, twenty years — it may go on for fifty years — you and I may not live to see the end of it.

I, personally, have hopes — wishful thinking — that it will terminate quickly enough so that I can pass the rest of my lifetime in comparative peace and comfort. But I'm not optimistic about it. During such a period, it is really difficult to keep a grip on yourself, but I think that we are better prepared to than some of the others.

I can speak more freely here than I could in a political. meeting, because it's a highly selected group. I've known a good many science fiction fans, and I've observed, statistically, certain things about them. Most of them are young as compared with other groups, most of them are extremely precocious — quite brilliant. I'd be very much interested to see IQs run on a typical group of fans.

But, even without IQs I know that most of the people here are way above average in intelligence. I've had enough data on it to know. I'm not trying to flatter you, I'm not interested in that. I am interested in the fact that you have unusually keen minds. However, that lays us

open, and I am including myself in this, lays us open to dangers that don't hit the phlegmatic, the more stolid. Unless we are able to predict, we are even more likely to be subjected to functional unsanities than those around us.

I'm preaching, sure. I know that. I could have filled a speech with wisecracks and with stories and anecdotes, but I feel very deeply about this. And if you can bear with me for a few minutes more, I still want to talk about it.

There's a way out, there's something that we can do to protect ourselves, something that would protect the rest of the human race from the sort of things that are happening to them, and are going to happen to them. It's very simple, and it's right down our alley: the use of the *scientific method.*

I'm not talking about the scientific method used in the laboratory. The scientific method can be used to protect ourselves from serious difficulties of other sorts — getting our teeth smashed in — in our everyday life, twenty-four hours of the day.

I should say what I mean by the scientific method. Since I have to define it in terms of words, I can't be as clear as I might be if I were able to make an extensional definition. But I mean a comparatively simple thing by the scientific method: the ability to look at what goes on around you. Listen to what you hear, observe, note facts, delay your judgment, and make your own predictions. That's all there is, really, to the scientific method: to be able to distinguish facts from non-facts.

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I used the term "fact." I used it in a technical sense, and I should say what I mean by a fact. A fact is anything that has happened before this moment, on July 4th, 1941. Anything that has already happened before this moment. Anything after this moment is a non-fact. Most people can't distinguish between them. They regard as a *fact* that they're going to get up and have breakfast tomorrow morning. They get the difference between facts and non-facts completely mixed up, and in particular, these days people are getting very mixed up between facts and. theories, isms, ologies and so forth, so-called "laws of nature," depending on what year you happen to be speaking.

That distinction between fact and fiction, fact and non-fact, is of extreme importance to us now. It has even become a strong issue in the field of science fiction. Without referring to any movement by name, or any person by name, because I wish to make an illustration, I want to invite your attention to the fact that the science fiction field

has been very much stirred up by a semipolitical movement which uses the word "fact" quite extensively. But it uses the word fact with reference to what they are — what they *predict* will happen in the future, and that's a non-fact. And any movement, institution, any theory, which does not make a clear and decided distinction between fact and non-fact, cannot by any stretch of the imagination be called a scientific movement. It simply is not because it does not use the scientific method. No matter how complicated their terminology may be, or how much they may use the *argot* of science.

I'm going to have to make an excursion here. I've wandered somewhat from the talk I had in mind.

I want to make another comment on science fiction and the fact that you and I have to put up with an awful lot of guff from people because of the orthodox point of view with which it is regarded.

I have never been able to understand quite why it is that the historical novel is the most approved, the most *sacred* form of literature. The contemporary novel is next so; but the historical novel, if you write an historical novel, that's *literature*.

I think that the corniest tripe published in a science fiction magazine (and some of it isn't too hot, we know that; some of my stuff isn't so hot) beats all of the *Anthony Adverses* and *Gone With the Winds* that were ever published, because at least it does include that one distinctly human-like attempt to predict the future.

One would think that the literary critics and the professors of English — those who make a business of deciding what is good and what is bad in literature — had some connection in their ancestry with the Fillyloo Bird. I think you know the Fillyboo Bird: he flew backwards because he didn't care where he was going, but he liked to see where he had been.

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I want to mention the fashion in which the scientific method — just the matter of observing what goes on around you — observing it through your own eyes, instead of taking other people's opinions, reserving your judgments until you have enough data on which to make a judgment — can be of real use to you even now, quite aside from any possible worse period in history, in the coming history.

I mentioned that it can keep your teeth from getting knocked in; that's an important point. It can because you'll stay out of controversies and out of arguments that you would otherwise get into. If you are talking with a man who obviously does not bother to use the scientific method, or does not know how to use the scientific

method in his everyday life, you'll never get in an argument with him. You'll know there's no point in an argument with him, that you cannot possibly convince him. You can listen — and you'll get some new data from him — and you'll be better able to predict thereafter, if on no other point than the fact that you'll be better able to predict what his reactions will be.

There are other advantages, in the way of keeping yourself cooled down, so you can be a little happier. For example, a man who uses the scientific method cannot possibly be anti-Semitic. I have made that an illustration because it has caused a lot of trouble in the world lately. Why can't he be anti-Semitic? For a very simple reason: he doesn't have enough data, consequently he hasn't formed an opinion. No matter how long he lives he can't hate all Jews, and unless he knows all Jews, he can't hate all Jews, because he doesn't form an opinion unless he has data. It is possible for him to hate an individual Jew as it's possible for him to hate an individual Irishman or Rotarian or man or woman.

But he can't possibly be anti-Semitic. He can't hate all capitalists, he can't hate all unions, he can't hate all women — you can't be a woman-hater, not if you use the scientific method. You can't possibly: you don't know all women. You don't even know a large enough percentage of the group to be able to form an opinion on what the whole group may be!

By the same reasoning, it's very difficult for him to hate at all; and if you can just manage to keep hate out of your life (or a good portion of it — I can't keep it *all* out of my life myself. I've got to sit down and whip myself about the head and shoulders to get myself calmed down at times — but you can help yourself with this method) — if you can keep hate out of your life, you can keep from; getting your teeth knocked in. You can keep out of a lot of difficulties and take care of yourself in a better fashion.

A man who uses the scientific method cannot possibly believe that all politicians are crooks, for he knows that one datum destroys the generalization. I'll give you one datum on that point: Senator George Norris, whether you like him or not, is a saint on earth. Whether you agree with his opinions or not, he's not a bad man.

And because he's never entirely certain of his own opinions on any subject, a man using the scientific method stays out of arguments, keeps himself from the emotional upsets that cause you to lose sleep and upset your stomach. You get such things as herpes — oh, I'm not an M.D., but there are plenty of functional disorders that a man can avoid, can very well avoid.

Here's a rough picture of the scientific man in everyday life. Such a man stands a better chance of living through our period to a ripe and-happy old age, in my opinion. But I wish to make plain that the use of the scientific method does not depend on any formal education in science. It is an attitude and point of view and not a body of information. You need have no formal education at all to use the scientific method in your everyday life. I am not disparaging the body of scientific information that has been gathered by specialists or the equally enormous body of historical and sociological data that is available. Unfortunately, we can't get very much of it. But you can still use the scientific method, whether you've bad a lot of education or not, whether you've had time to gather a lot of personal data or not.

With respect to the acquisition of scientific training, I've heard people around fan clubs remark, "I wish I knew something about mathematics," or "I wish I understood something about physics." Complaints that they're not fully appreciating some of the stories because they don't have enough specialized information. Some subject was too hard, or they weren't able to go far enough in school. I greatly sympathize with that.

I'm not trying to play it down or anything of the sort. It's very much of a regret to me that I'm not at least twins and preferably triplets, so that I could have time to study the various things that I'm interested in. And I know that a lot of you have felt the same way — that life is just too — not too short, but too narrow — we don't have room enough, time enough, to get around and learn all the things that we want to, and it is almost impossible for us to get a full picture of the world.

Surprising, that the data actually is available. God knows that no one can even hope to cover even a small corner of the scientific world these days. I think there's a way out of the dilemma, however, a fair one for us, and a better one for our children. It's the creation of a new technique to cover just that purpose. Men who might be considered encyclopedists, or interpreter-synthesists, I like to call them, men who make it their business to find out what it is the specialists have learned, and then apply it to the rest of us in consolidated form so that we can have, if not the details of the picture, at least the broad I outlines of the enormous, incredibly enormous, mass of data that the human race has gathered. The facts behind us, the things that have happened before this moment, so that we can be better able to predict for ourselves, plan our lives after this moment.

There's only one synthesist who has really made such an attempt up to the present time, and I'm very pleased that it happens to be

possibly the greatest of the science fiction writers: H. G. Wells. Wells perhaps didn't do a good job of it — good Lord! he didn't have a *chance* to; he had nobody before him, he did the pioneer work. He started it. But H. G. Wells, in his trilogy, *The Outline of History, The Science of Life* and *The Work, Wealth, and Happiness of Mankind,* is, so far as I know, the only writer who has ever lived who has tried to draw for the rest of us a full picture of the whole world, past and future, everything about us, so we can stand off and get a look at ourselves.

It will be better in the future. Nevertheless, it was great work, the fact that he *did* it, that he tried at all. A wonderful work. Because he had done that kind of work, that he tried to do that kind of work for the rest of us, is the reason, to my mind why his scientific fantasies are more nearly accurate in their predictions than those of, oh, myself, and various other commercial writers in the field. I don't know as much as H. G. Wells: I probably never will know as much as H. G. Wells — my predictions can't be as accurate.

But, after considering H. G. Wells' trilogy, it occurred to me that it would be amusing, to me at least, and I hope to you, for me to mention some books by assorted writers that, to a certain extent, help to fill in the gaps in the picture. And — to a certain extent — help to make up the lack of a broad comprehensive scientific education, which no one, not even Sc.D.s and Ph.D.s, can really have.

For example, in mathematics, is there one book which will help the non-mathematician, the person who hasn't specialized in it and made it his life work, to appreciate what mathematics is for? I've run across such a book; it's called Mathematics and the Imagination by Kasner and Newman. You don't have to have any mathematical education to read it. To my mind, it's a very stimulating book, a very interesting book, and when you've finished reading it, you at least know what the mathematicians are doing and why.

Among other things, you will discover — and this runs entirely contrary to our orthodox credos — that mathematics is not a science. Mathematics is not a science at all — it's an aspect of symbology, along with the alphabet. That there is no such thing as discovering mathematics, for example. Mathematics is invented; it's an invented art, and has nothing directly to do with science at all, except as a tool. And yet you will hear the ordinary layman speaking time and again of mathematics as a science. It just plain is not because it has no data in it; purely inventions, every bit of it, even the multiplication tables. Yes, 2 x 2 is 4 is an invention in mathematics, not a fact.

There are other such books. In physics, there is Eddington's Nature

of the Physical World, I think one of the most charming books ever written, one of the most lucidly and brilliantly written books. It gives a beautiful background to modern physics. It's approximately fifteen years old, so in order to cover a lot of the things that are currently being used for fiction in the science fiction field, you would need to supplement that. The book I got for my own purpose to supplement it — because, you see, I'm not a professional physicist, I'm an engineer — to help to bring it up to date, is White's *Classical and Modern Physics,* published in 1940. It is about the latest book-bound thing on modern physics that I know of.

There are later things in such publications as *Physical Review* and *Nature,* but this goes up to and including the fission of uranium. It includes nuclear physics, and it delighted me to find the thought that, very likely when we got around to it, we'd find life on other planets. A very stimulating thing to get from a professional scientist, particularly in the field of *physical* sciences. I picked that book because White is an associate of Lawrence in the nuclear laboratory at Berkeley. In other words, he is in on the ground floor, he knows what he's talking about. It's modern physics, 1940, the best up to that time.

So far as astronomy is concerned, I've never seen anything that surpassed, for a popular notion of the broad outlines of the kind of physical world we live in, than John Campbell's series that appeared in *Astounding.* They started in 1936, and ran on for fifteen or sixteen issues, his articles on the solar system. I've always been sorry that Campbell did not go on from there and cover stellar astronomy, galactic astronomy, and some of the other side fields. But, even at that, anybody who has read through that series by Campbell on the solar system will never again have a flat-world attitude, which most people do have. Not in the science fiction field, of course — I mean not among fans of science fiction.

(I speak many times as if the human race were divided into two parts, as it *may* be; people who love science fiction, and people who don't. I think you will be able to keep sorted out which ones I'm talking about. I hope so.)

In the field of economics, an incomplete science, but nevertheless one that you can't possibly ignore, I think the most illuminating book I've ever, read is one by Maurice Colburn, called *Economic Nationalism.* The title won't give any suggestion of what the contents are, but that is simply the tag by which it is known.

Jim Fancy's *Behind the Ballots* is probably as nice a job of recording actual data in politics as I've ever seen; however, politics — I'd never recommend that people read books in the political field.

Go out and take a look *yourself.* Everything else you hear is guff.

I saved for the last on that list of the books that have greatly affected me, that to my mind are key books, of the stuff I've plowed through, a book which should head the list on the *must* list. I wish that everyone could read the book. There aren't many copies of it, and everyone can't, nor could everyone read this particular book. All of you could — you've got the imagination for it. It's *Science and Sanity* by Count Alfred Korzybski, one of the greatest Polish mathematicians when he went into the subject of symbology and started finding out what made us tick, and then worked up in strictly experimental and observational form from the preliminary work of E. T. Bell.

A rigor of epistemology based on E. T. Bell [break in transcript here — some words lost] ... symbology of epistemology. The book refers to the subject of semantics. I know from conversation with a lot of you that the words epistemology and semantics are not unfamiliar to you. But because they may be unfamiliar to some, I'm going to stop and give definitions of those words.

Semantics is simply a study of the symbols we use to communicate. General Semantics is an extension of that study to investigate how we *evaluate* the use of those symbols. Epistemology is the study of *how* we know *what* we know. Maybe that doesn't sound exciting. It is exciting, it's very exciting. To be able to delve back into your own mind and investigate what it is you know, what it is you *can* know, and what it is that you *cannot possibly* know, is, from a standpoint of intellectual adventure, I think, possibly- the greatest adventure that a person can indulge in. Beats spaceships.

Incidentally, any of you who are going to be in Denver in the next five or six weeks will have an opportunity, one of the last opportunities, to hear Alfred Korzybski speak in person. He will be here at a meeting (similar to this) of semanticians from all over the world; McLean from Los Angeles, and Johnson from Iowa, and Reisser from Mills College and Kendig and probably Hayakawa from up in Canada — the leading semanticians of the world — to hear Korzybski speak.

It is much better to hear him speak than it is to read his books. He's limited by the fact that he's got to stick to the typewriter, to the printed word, but when he talks, when he talks, it's another matter! He gestures, he's not tied down with his hands to the desk the way I am, he walks, stumps all around the stage, and waves his hands, and when he's putting quotation marks on a word, he puts them on… [illustrates, audience laughs]. And you really gather what he means. Incidentally, he looks like Conan Doyle's description of Professor

Challenger if Professor Challenger had shaved his beard. Dynamic character.

You may not like him personally, but he's at least as great a man as Einstein, at least, because his field is broader. The same kind of work that Einstein did, the same kind of work using the same methods, but in a much broader field, much closer to human relationships. I hope that some of you will be able to hear him. I said that this will be one of the last chances, because the old man's well over seventy now. As he puts it, "I vill coagulate someday, I vill someday soon, I vill coagulate," which is the term he uses for dying.

He speaks in terms of colloidal chemistry. Properly, it's appropriate. He won't last much longer. In the meantime, he's done a monumental piece of work that H. G. Wells did in the matter of description, and the two together are giants in our intellectual horizon, our intellectual matrix today, that stick up over the rest like the Empire State Building.

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I started out to talk primarily about science fiction and I got off on some of my own hobbies. It's a luxury to me not to be held down by a plot and a set of characters. Here I can say anything I like and not be bothered.

I myself have been reading science fiction since Gernsback started putting it out in the *Electrical* Experimenter. Then I read it in *Argosy* and I dug up all that I could out of the Kansas City Public Library. Every member of my family had a library card; there were seven of us, so I could bring home quite a number of books at one time. I wear glasses now as a result. I never had any particular notion of writing it until about two years ago when a concatenation of peculiar circumstances started me writing. I happened to hit the jackpot on the first one, so I continued writing. It amazed me to discover that people gave money away for doing things like that — it beats working.

It's likely that I won't be writing very much longer. With the way things are shaping up, I'll probably have other things I'll have to do, as will others here, whether we like it or not. But I hope to be a fan of science fiction for at least fifty years if I can hold myself together that long and keep from getting my teeth kicked in.

All I really want to do is to hang around as long as I can, watch the world unfold, see some of the changes — what they really are — that suits me.

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# The Future Revisited

## Guest of Honor Speech at the XIXth World Science Fiction Convention — Seattle, 1961

Madame Chairman, Banquet Chairman, members of the World Science Fiction Convention, friends — protocol now requires that I make a speech.

I don't know why this is so. I'm quite sure that nothing I can say tonight can compete with the entertainment offered last night.

There will be a question period. But right now, under a precedent established at the First World Science Fiction Convention, I am expected to produce some Big Thoughts giving clear evidence of a Deep Thinker.

It has been just twenty years since the last time I did this. A good interval, I think — it gives time for a new generation of fans to grow up and thereby reduces the likelihood that discrepancies between the Deep Thoughts on the first occasion and the Deep Thoughts on the next occasion will show up — it lets me speak freely.

Is there anyone here tonight who was at the Denver Convention in 1941? Do you recall what I said on that occasion?

You see? That shows you what one gets for deep thoughts. My subject twenty years ago was THE DISCOVERY OF THE FUTURE. My subject tonight is THE FUTURE REVISITED — and we'll check up a little, not too closely, on whether what I said twenty years ago still makes sense.

If you all will be so gracious as to invite me again, twenty years from tonight, I'll be happy to accept. 1981, that will be — I can't accept for 1984; Big Brother will be watching.

We might hold the 1981 convention on the Moon, at Luna City. I understand that there are very few conventions on the Moon — and these affairs have been growing more and more unconventional over the years — so we should call it Looneycon.

My subject in 1981 will be — obviously — THE FUTURE ... WHATEVER BECAME OF IT?

But it may be more practical — more in accordance with the

wishes of the authorities — for us to hold the 1981 Convention in some small garden city of the future located on the Arctic Ocean in the far north of Siberia.

We can call it the SlaveCon.

I went back and reread that speech of twenty years ago in order to see just what slips I would have to cover up or explain away tonight.

I found that it was not going to be necessary to cover up — largely because I had been too cagey to make very many specific predictions. However, I did make two hard-nosed predictions.

I predicted that the years immediately following 1941 would be a period of great and radical change — change so great that most people would not be able to understand it, assimilate it, cope with it — and that the whole world would start behaving irrationally — crazy.

Does anyone want to dispute that it has? If so, I won't argue — I'll simply refer them to the headlines in tonight's paper.

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I also said that science fiction fans, because they were interested in the future and believed in change, would not be so shocked by these drastic changes we have seen these past twenty years and thereby stood a better chance of not going crazy when the rest of the world did.

I can't prove that I was correct in this prediction — or pious hope — by referring you to the headlines. But I can't see that science fiction fans are one whit crazier than they were twenty years ago.

The second firm prediction I made in 1941 was a dead cinch, no harder than predicting tomorrow's sunrise — at least it seems that easy, looking back instead of forward. I said that the series of wars the world was in would go on for five, ten, twenty, possibly fifty years — Now look at the damned thing, twenty years later!

Anybody here with a transistor radio? Will you keep it tuned to Conelrad, please?

Let's update that prediction tonight. Things are even worse tonight than they looked in 1941, with World War II already raging and Pearl Harbor only weeks away. 1941 looks like the Good Old Days now — There is no peace in the future for any of us...even the youngest here.

In .prophesying tonight I am going to be less cagey, more specific, than I was in 1941 — although not so specific as to try to guess tomorrow's headlines. In the wisely cynical words of L. Sprague de

Camp: "It does not pay a prophet to be too specific."

But, as William Lindsay Gresham said, "You'll never get rich prophesying gloom." But I'm not trying to get rich tonight; I'm trying to make some hard-headed predictions — and I'm sorry to say that my crystal ball does not have very many nice things in it — not for the rest of this century.

So, for any of you who don't want to hear bad news, this is a good time to slide out the side door.

Wishful thinking — it would be so much pleasanter to indulge in wishful thinking. Do you remember a story, in Astounding I think, three or four years ago — "The Cold Equations"? One of the most nearly perfect science fiction stories ever written — and one of the most bloodcurdling.

Remember it? A sweet young girl, stowed away on a spaceship. Lots of stories have started this way...and they usually end with a romance between the pilot and the sweet young stowaway, with a lavish ration of cops and robbers in between before he gets her.

This one didn't. No cops and robbers, no romance. The Cold Equations — the laws of nature — said that she had to be jettisoned — *killed* — to permit that spaceship to land.

And she was killed. There wasn't any other possible answer.

By 1980 a solid world government, guaranteeing permanent peace and civil liberty to all, even to the citizens of those nations that choose to remain socialistic, a concerted effort by all nations to control population and raise living standards for all. Cancer conquered, and all the diseases of poverty and filth being brought under control as we devote the effort to world public health that we now devote to armaments and war, a thriving colony on the Moon, and a base on Mars, cheap and easy space travel...plenty to eat for everybody — that is what I would like to predict tonight. How I would love to live in such a world!

The Cold Equations say No.

I'll never see such a world. I'll be doing well to stay alive to my natural span.

And so will *you*.

Because one-third of us here in this room will die in the near future.

H-bombs? Probably *not* H-bombs. But there are lots of other ways to die besides H-bombs, some of them much nastier than blast or

radiation burns. Such as being waylaid and killed by your next door neighbor because you have food. Or he thinks you have.

Or starving slowly in a slave camp. Oh, it can happen! There was a member of my family — who was a wealthy woman in 1941 — in 1942 she was in a concentration camp. She's dead now, the camp killed her — *very* slowly. Her husband is dead, too, but not the same way. He was a military P.O.W. — they took him out and lined him up along with eight hundred others and machine-gunned them.

Oh, yes, there are some things worse than H-bombs and fallout — and some of us here tonight are going to get intimately acquainted with them...in the near future.

How near? Probably not this week. The logic of war today is such that it is most exceedingly unlikely to break out in the middle of a crisis. In this new sort of war the real crisis never stops — and the poorest time to start the hot war is in the middle of a cooked-up crisis such as the one we are in tonight. The hot war is much more likely to break out — if it ever does break out, which is not the likeliest alternative — after a period of sweetness and light, of "peaceful coexistence," with no hint of warning.

So, if you want to make a trip around the world, even visit Berlin, or Moscow, go right ahead and don't worry. You'll, be at least as safe as you are at home. So do it — live it up! Have fun.

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*Gather ye rosebuds while ye may*

*Old Time is yet a-flying*

*For while we're all still here today*

*Some morrow we be dying.*

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Of all the possible futures ahead of us for the rest of this century most of them encompass the destruction of the United States of America as the political entity we know and with the death of at least 50 or 60,000,000 of her citizens. Our country destroyed and one-third of us dead — you — and you get it — so long, Ted — honey, you're too young to die!

Well, I've lived a full life — and the Cold Equations apply to me as much as to anyone. With any luck I'll be the first man on my block to glow in the dark — but with bad luck I'll have to go the hard way.

The secret of correct prediction is to shun wishful thinking and coldly believe the Cold Equations. Shun pessimistic thinking, too — as

I am doing and as I shall presently prove to you. Treat the world the way a research scientist treats a problem — examine the data, try to organize, try to predict coldly and logically. Not what you *want* to have happen — but what *can* happen and what is most *likely* to happen — and then, and *only* then, what you yourself can do about it, to make things easier or better or safer for you and your kids.

You don't cope with a cancer by forgetting it, and hoping it will go away.

You don't avoid a traffic accident by closing your eyes. Ninety percent of the possible futures ahead of us fall into two groups, none of them good.

All other possibilities — call it ten percent, I simply mean some small and unlikely fraction of the things that can happen to us; the remaining possibilities represented by this arbitrary ten percent are such wild chances as the sun going nova soon, or flying saucers landing on the White House lawn and in Red Square followed by the Galactic Overlords taking us under their benevolent wings — God, how many times have I read that story! Read it? — I've written it!

Or Nikita Khrushchev suddenly being converted to Christianity and volunteering for Mr. Kennedy's Peace Corps.

All you can say for those possibilities is that they are, none of them, physically *impossible* — but don't stay awake waiting for them.

The remaining nine chances out of ten, the probable futures, break into two parts. The first part — I won't say "first half"; there is no way to estimate the percentages — the first part is the blowup, the catastrophe, the one most science fiction stories have been written about or assumed as a condition, present or past, for the sixteen years since Hiroshima — I mean World War III, all-out and with all the trimmings, from H-bombs on Seattle and New York and fifty other targets to biological warfare and any other nastiness your imagination cares to contrive — and you can be sure that if your imagination picked the wrong choices, what will happen will be, still nastier.

This first part, World War III, splits logically into two subdivisions: one in which we win, one in which we lose. Some people like to add a third case here, in which both the U.S. and the U.S.S.R. are so crippled that neither one wins — but that is not truly a third situation — because in that case China wins.

All I want to point out at the moment is that something on the order of one-third of us die, no matter who wins. Not one-third of the Russians — one-third of us.

Or do we? Let me make a quick check. Will any of you here who have already built and stocked a fallout shelter please hold up your hands?

I expected it — I've asked this same question of a number of widely varied audiences; very few Americans are prepared to stay alive while the fallout cools down. Nor am I criticizing, please note that my hand did not go up. My wife and I have no fallout protection of any sort. I'm not proud of it, I'm not ashamed of it — I'm simply in the same boat as almost everybody else and have paid as little attention to the warnings.

I'm not preaching, I'm not urging you to hurry home and start filling sand bags and bottling water. This is how it is. We are not now prepared to live through a heavy attack — and those figures of a third or maybe a half of us dead stand — unless we do prepare. If we do; and from what I've seen of American temperament I doubt if we will prepare.

The other part that makes up the ninety percent of all of our possible futures is simpler, slower — and just as deadly in the long run. In due course, with no more than minor brush wars unfelt by any but the poor blokes who get killed in them, the United States will find itself in a situation where the simplest, easiest, and safest thing to do will be to surrender. Maybe it won't be called surrender — maybe it will be called a "realistic accommodation" by the editorial writers that year — or a "treaty of non-aggression with commercial agreements for mutual trade" — or anything. The name doesn't matter; the idea is that the Kremlin will be giving the orders here rather than Washington.

Death then comes to many of us with that whimper rather than the big bang and, of course, not nearly as quickly. But just as thoroughly. The laddies who liquidated the trouble in the Ukraine, and used tanks on the school boys of Budapest, won't hesitate to liquidate the bourgeois mentality here. You can ask yourself, most privately, whether or not you are of the temperament to live through this — and *I* don't want to know the answer! But my own estimate of the average American Joe Blow is such that I expect the long-term casualties if we surrender to be at least as high as the casualties in all-out war. We've been free a longtime, we won't take kindly to chains, a lot of us; they will have to liquidate, one way or another, quite a large portion of us before we will be docile.

But it will be slower and not nearly so spectacular. Just nastier — That's all. That fills up the entire ninety percent of probable futures for us. All the other possibilities lie in that ten percent or less which

are wildly unlikely.

"Now, wait a minute! There's one more. If we can just manage to avoid an all-out war —"

I can hear you saying it. I rather suspect that we *will* manage to avoid an all-out war. That is our most probable future. The Kremlin doesn't want war — God knows the Russian people don't want war although they won't have any choice, either way — and most Americans are most reluctant to face the prospect of a real war — how many of you have built fallout shelters? — that's proof. And I must admit that I am selfish enough to enjoy peace, such as it is, as long as it lasts. It is possible, though not too probable, that I will die of natural causes before this slower defeat overtakes us.

Let me define it. The remaining possibility is that, if we avoid an all-out World War III, that in time the Communist Axis would reform internally, cease to be aggressive and imperialistic, cease to menace us and the rest of the world, start being a peaceful, socialistic neighbor, something like Sweden. Or that, if we just wait long enough and avoid war, the Russian people themselves and the Chinese people will rise up, throw off their oppressors — and save us the headaches.

Okay, it's physically possible, we must add it to the list.

But not in the ninety percent.

This must be placed over in the fraction of wildly unlikely possibilities, along with the Galactic Overlords and Nikita Khrushchev learning to sing "Jesus, Lover of my Soul."

Anything else is wishful thinking at its sorriest.

Over and over again since my wife and I returned from the Soviet Union last year, people have said to us, almost pleadingly, "Don't you think that, in time, as they get more consumer goods and improve their standard of living, that the Russians will —"

No, I don't think it!

The first and most important thing to learn about Communists is that they behave like Communists.

Communism is a religion, an extremely moralistic and utterly engrossing religion. Do you think that you could possibly wean a Catholic priest away from his faith by offering him an improvement in his standard of living?

Preposterous! And, believe me, a devout Communist cannot be seduced with sirloin steaks and Cadillacs. Or Zims.

The first thing to learn about Communists in order to understand

them — and thereby guess how the frog will jump — is that Communists are not villains!

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Let me repeat it like a radio commercial: Communists are *not* villains!

They are devout, moral, very moralistic, kind, humane, and utterly convinced — by *their* standards! And they live by *their* standards!

Even Nikita Khrushchev, the butcher of the Ukraine and Hungary, is not a villain — not in his own mind. His conscience is clear and his motives are pure. He feels no more guilt for anything he has done than did the Grand Inquisitor of Spain in the time when the Inquisition was at its roughest — and for exactly the same reason: Nikita does what he does for the highest of moral reasons — by *his* standards.

Until you learn this one thing about Communists you have no chance of reading and understanding the Cold Equations.

Communists are nice people, almost all of them. They are sincere, they are true believers — and they won't be seduced by sirloin steaks. I have been in six Communist countries and in eight of the so-called Republics of the Soviet Union — in much travel over many years. I know many, many Communists, know them and like them. Like them? Of all the major peoples on this planet the Russians and the Chinese are the most like us, the ones I like best — and it is a matter of deep sorrow to me that these sweet and warmhearted people should be elected by the logic of history to be our antagonists.

I wish you all could know them as well as I do — and I wish you could have the tremendous advantage, as I had, of having a wife who had gone to the tremendous effort of learning to speak Russian fluently before we went there.

This is impossible for most people, I know — I was lucky. Nevertheless it is possible to learn something intellectually of how the Communist mind works by studying, hard and sympathetically, Dialectical Materialism, the history of Communism and other aspects of Marxism-Leninism.

Know your enemy — the first law of war.

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If the American people and in particular American political leaders took the trouble to try to learn the mind and methods and high moral standards of their enemy, we would not behave as foolishly as we do.

We might even save the lives of a third or more of our people.

To understand him on his terms — Not on ours, not on our bourgeois, capitalistic, democratic, almost anarchistic terms — but to learn what he thinks of himself — and why. Learn that Russians love their country, are loyal to their own form of government mostly — probably a higher percentage than of Americans loyal to their government, honestly believe that Communism is the salvation of mankind — if we learned these things, we wouldn't rely on Mr. Micawber's solution and wait for something to turn up.

However, I don't see one chance in ten thousand of Americans — enough Americans — getting to know the mind of the enemy well enough to realize this. Won't happen. Instead, we will go right on applying our own rather fuzzy and good-hearted humanitarianism and will go on applying to Communists our own parochial and rather naive standards — and will go on misunderstanding him and continue to be utterly surprised when he acts like a Communist.

It will likely be the ruin of us. Only in the rather unlikely chance of us stumbling into a war — and winning it at a cost almost too dreadful to visualize — can I see anything but ruin ahead.

However, if any of you, as individuals, want to understand the years ahead, just remember this: the key to it all is Communists are not villains.

Not that this will do our country any good — because the vast majority of us will go on thinking of Communists either as devils, or as poor stupid clunks who can be seduced by sirloin steak. And this misconception is going to ruin us and kill many of us.

But it isn't all bad —

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Bear in mind that our ancestors outlived the saber-tooth tiger, lived through the Black Death. The human race isn't washed up yet and won't be. Forget On the Beach; the future isn't that bleak If a third of us will die, that still means that two-thirds of us will live — and the loss won't matter to the human race. This, our race, is appreciating at the rate of 160,000 humans per day now — 60,000,000 Americans can be replaced in how long? A year and ten days

Oh, most of them will be Chinese rather than Americans — but is this bad?

Only for us. It may well be an improvement; the Chinese have been raised in fortitude for centuries...whereas we have been living pretty high on the hog and keep alive our poorest stock. Racially and

genetically it may well be an improvement for a third of us to be killed off.

That doesn't mean we have to like it.

I'm merely saying let's not feel too tragic about it simply because it's us — racially we aren't all that important.

And do remember that this little group here tonight can't do much about it, one way or another. This wouldn't be the place to attempt to start political action to try to change things anyhow; we here represent too many highly divergent viewpoints — including, I would guess from the size of the group, at least a handful of devout, convinced, and non-villainous Communists.

No, tonight we are simply examining what is likely to happen in the future.

Twenty years ago I urged the convention audience to prepare themselves against the shock of change, so that they could roll with the punch, be as happy as circumstances permitted — and increase their chances of survival.

That still applies, twenty years later. Nobody will live through the extremely rough period ahead of us, a period that probably will see the end of our national history, by getting the jitters, flipping his lid, or being overcome by the horror of it all.

The period ahead of us is guaranteed not to be boring. I said that science fiction fans apparently had not changed in twenty years. That is not quite true of many science fiction writers. Or perhaps it is the editors, since I am judging by the stories I see in print.

Twenty years and more ago science fiction writers (as it seems to me) were much more free swinging. The worlds they wrote about were dangerous and they never apologized for it — whereas today many sf writers seem to write sweet little stories about a bucolic culture after the blowup with everyone determined never to let the scientists get out of hand again — so help me, to read many of the sf stories today you would think that Lord God Almighty made a terrible mistake when He invented radioactivity and that it was up to the human race, as instructed by sf authors, to correct His error.

But take a look back twenty-odd years ago. The worlds of Doc Smith's space epics make the prospects of World War III look like a tea party. Nor was he alone. John Campbell, in his space sagas, always described scenes just as rough — and so did Jack Williamson. Those were terrible and terrifying universes — yet their characters charged in undismayed, against any odds — scattering blood over thousands

and millions of parsecs.

It seems to me that most of the writers today have fallen sick of the jitters. An all-out space battle, with beams flashing and planets destroyed in the backlash is just too horrible for them to think about.

Many of the sf writers today seem to have acquired a permanent nervous breakdown during and after World War II. Some of the things that science fiction long predicted have come to pass — and now they're scared silly.

I don't understand it.

Look, friends, the only possible way to enjoy life is not to be afraid to die. A zest for living requires a willingness to die; you cannot have the first without the second. The '60s and '70s and '80s and '90s can be loaded with the zest for living, high excitement, and gutsy adventure for any truly human person.

"Truly human"? I mean you descendants of cavemen who outlasted the saber-tooth, you who sprang from the loins of the Vikings, you whose ancestors fought the Crusades and were numbered the Golden Horde. Death is the lot of all of us and the only way the human race has ever conquered death is by treating it with contempt. By living every golden minute as if one had all eternity.

About fifty years ago when I was a small child a thing happened in my home town which made a permanent impression on me. My family lived in Kansas City then; there is a large park in the south of town, Swope Park. Almost every Sunday in good weather we would. ride the street car out there and enjoy the park. Through the park runs — or did run, then — a railroad track, the Katy line. There were half a dozen places where one could cross the track on foot.

A man and his wife were walking in Swope Park one Sunday, started across those tracks, and she stepped on a switching juncture, got her foot caught in it — stuck tight.

Nothing to panic about, there were no trains in sight and that line carried only a couple of trains a day.

But she found that she' could not pull it out even with her husband's help — and there was no one else around.

They both worked away at it for several minutes when a stranger came along, a man, and now all three of them strained and pulled.

No luck — and now they heard a train coming.

Too late to flag it down — too late to do anything save continue to try to get her foot out of there.

Of course both the husband — and the stranger who had happened along — could have saved themselves easily.

But they didn't. Neither gave up, both men kept trying and were still trying as the train hit them.

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The wife and the stranger were killed at once; the husband lasted just long enough to tell what happened and died before he could be moved.

The woman had no choice. The husband had a choice but acted as a husband should.

But what about the stranger?

No one would have blamed him if he had jumped clear at the last moment at which he could have saved himself. After all, in sober fact, the woman could not be saved — it was too late. She was not his wife, not his responsibility — she was a total stranger, we don't know that he ever learned her name.

But he didn't jump back. He was leaning over, pulling at this stranger's leg with all his strength when the locomotive hit him. He used the last golden moments of his life, the last effort his muscles would ever make, still trying to save her.

I don't know anything about him. I didn't see it happen and when the crowd gathered — amazing how fast a crowd can gather even in a lonely spot once an accident happens. My parents got me quickly back and away from there to keep me from seeing the mangled bodies. So all I really know about it is what I can recall ,from hearing my father read aloud the account in the Kansas city *Star*.

I don't even know the stranger's name. The newspaper described him as about twenty-eight, I think it was, and a "laborer." Probably that means "hobo" as he was walking along the tracks. It is possible that this married couple who died with him would never, under other circumstances, have met him formally, might not have been willing to sit down and eat with him.

I don't know. I'll never know anything about him except how he chose to spend the last five minutes of his short life ... and how he elected to die.

But that is really quite a lot and I've thought about it many times since. Why did he do what he did? What did he think about in those last few rushing minutes when the train bore down on them? Or did he think about anything save the great effort he was making? Was he afraid? If he was, what inner resources did he draw on to offset that

fear with ultimate courage?

We can't know. All we know is that, with no flags flying, no bands playing, — no time to prepare his soul for the ordeal — he did it.

And the only conclusion I have ever been able to reach is this: This is how a man lives. And this is how a *man* dies.

His caveman ancestors have good reason to feel proud of him — and this is why the caveman's children are reaching out to the stars — and will *reach* the stars.

Would it have made a difference if some other man or woman had happened along in place of this nameless stranger? Did inexorable fate bring this hero to his appointed triumph? Or was it coincidence so wild that an author would be ashamed to use it that a man with the necessary courage happened to be walking along that railroad track?

I don't think any of these things are true. I suggest that it really didn't matter much in the outcome which human being happened along. I have great respect for the race of which I now have the honor to be a member and I think that the chances are at least seven out of ten that *any* stranger with the same gutsy abandon would have done the same thing. You here in this room. Anybody

This is not a tale about how a man happened to die in Swope Park on a Sunday afternoon back when Taft was President. This is a story for any year about how a *man ... lives*.

The next ten, twenty, thirty, forty years will offer exceptional and rewarding opportunities for busy, happy, and adventurous living — to men and women who are not inclined to worry too much about just how *long* they will live.

It is possible that these many opportunities for a busy but short life will come as a result of us fighting and winning World War III, then trying to occupy the U.S.S.R. Let us say that this will be a very interesting experience and that at least some of the natives will not take kindly to being occupied — as Hitler learned and as Khrushchev himself learned in the Ukraine — and let us note also that atomic weapons are very little use against an underground — and then let it go at that.

But I do not see us as the most likely winner. If we lose the war — or surrender without fighting — there will be, here in America, a long, long period of underground resistance. It will be both the most tragic and the proudest era in our history.

But not necessarily an unhappy one for those who choose to fight. Happiness does not come from sirloin steaks and Cadillacs — nor does

hardship and danger mean unhappiness to thosç who choose it voluntarily. These are not the circumstances under which people commit suicide.

Nor will occupation of the United States necessarily be too uncomfortable for the survivors who choose not to resist. Oh, it will bç different all right — but probably more like Czechoslovakia than like poor Poland. Life under Communism actually isn't so awfully difficult for most people — just dreary — unless you happen to be terribly fond of marching and group calisthenics.

But life for the underground resistance fighters will be most difficult — but not dreary. And it will be a great day for the 4-F, and the female warrior, and the overage warrior. No bureaucratic piffle about flat feet or underweight or poor eyes or underage or overage — or even a growing cancer — this is a game with no rules and any number can play. Women will be just as welcome as men — a rifle or a knife wielded by a girl kills just as dead as one in the hands of a professional soldier. Besides that, women, especially if they are young and pretty — or either one — have weapons at their disposal in this sort of irregular fighting that we men simply don't have.

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It will be a glorious and tragic period and it will go on for a long, long time.

If any of you here think that you might decide to join the underground when the time comes, rather than simply knuckle under and do as you are told, you may want to give it some thought and a certain amount of preparation ahead of time. In the first place you obviously can't take part in it unless you manage to live through WWIII — if they hold it. I won't discuss how to do this, as it is really very simple and the instructions are available at any Civil Defense office — unless, of course, you are at ground zero of a direct hit, a factor which renders all other considerations academic.

Besides dodging fallout, you may want to stash away some weapons and some ammunition — it will save you from having to steal them barehanded from Russians or Chinese afterwards — time-wasting and chancy. I won't go into the matter of what weapons or how much ammunition, either, except to say that if you happen to live in a state which has a registration law on guns, then buy your weapons in some other state, sneak them home, and hide them against der Tag — because the very first thing a military provost does is to go to the local records, find out who has guns, send squads around to pick them up — or shoot those who fail to surrender them.

You will want to learn how to make grenades and bombs in your own kitchen, too. Ask almost any chemist — my wife Ginny, or Isaac Asimov, or Will Jenkins, or Tom Scortia.

But most of all you will want to study — ahead of time — how to fight and stay alive. Your object will be to cause one of the conquerors to die for his country — not the other way around — and this sort of irregular fighting is a high art.

Fortunately there are books, excellent books. Here are three: *New Ways of War* by Tom Wintringham, *Guerrilla Warfare* by Yank Levy, and *The War of Guerrilla* by Che Guevara.

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All three of these books are by Communists — and you can't possibly find better teachers anywhere.

If you can't lay hands on one of these, there is a book *Kill or Get Killed*, by an American colonel, Rex Applegate, just published by Stackpole this year. I don't know how good it is — and I do know that these three Communist books are good — but it may be easier to buy and it is well recommended.

This advice is just a footnote in hope that if you do decide to join in, it might keep you alive a bit longer, at least. And if you do — good luck to you! Good hunting! Maybe we'll even run across each other some day — if we're both lucky, long enough.

It will be the most glorious and tragic period in our history — and it will go on for a long, long time.

But I am forced to say that it will not succeed. This is almost certain. Because no underground anywhere in history has ever managed to throw off their conquerors without help from outside.

And we aren't going to have any help. Not any.

So in time, all of us who resist will be killed — or be captured and shipped off to slave labor camps. There is no hope of winning. You won't have any more chance than that nameless stranger did when he chose to stick it out and be killed by that locomotive. All in this world that joining the underground has to offer is a chance to live as a man — and be happy as long as you are alive.

However, to some people that is quite a lot.

I think it behooves every one of us to take out his soul and examine it carefully — and decide just what sort of person he is — before the chips are down. You'll save yourself a lot of grief.

There are only two rational points of view; this is an either-or

situation. Either you believe in your heart: "Give me Liberty or Give me Death" or, — your viewpoint is: "I'd rather be Red than dead."

No tertium quid. No middle ground. It's that nonexistent middle ground the wishful thinkers are looking for when they ask, "Don't you really think that the Russians, as they get more consumer goods and more cultural exchange with those of us in 'the free world, that they will —" and the rest of that nonsense.

This conflict will be resolved. Not because we wish it, but because Communists behave like Communists and they will change, in the words of Nikita Khrushchev, when shrimps learn to whistle.

So find out where you stand — don't tell me, tell yourself.

This is a good time to say a word in praise of one of the greatest minds of this century — Bertrand, Lord Russell. A mind like a computer, utterly logical. I won't repeat his arguments — go look them up. Because no one has ever stated the arguments for pacifism and surrender more logically and more cogently. I can't disagree with him in any way. The man makes sense.

My only difference with him is the total disagreement of starting from a different set of unarguable values. I honor and respect Lord Russell...because he knows where he stands and why and has the courage to stare open-eyed at the consequences of his own, moral values.

But I have no use at all for the wishful thinker who makes himself believe that, if he just closes his eyes to it, the horrid things will all, go away.

So examine your souls. "I'd rather be Red than dead" — nobody can argue with that. If you've got it in you to knuckle under and be one of the sheep — to be a collaborator, find it out *now*. It can save you a lot of grief in the future You can still build your fallout shelter, live through it — surrender without resistance and save your own life and the lives of your children If you've got talent for not fighting City Hall, you can even make a pretty good thing of it — perhaps better than you have now.

Only one minor drawback some dark night you may encounter a neighbor who is still bull-headedly attached to an older slogan: "Give me Liberty or Give me Death" — and in his stiff-necked way, *resents* your collaboration.

He may cut your throat. He *will* cut your throat! — if you are careless.

This is really sad. It really is. I mean it. A pacifist doesn't want to

out anybody's throat, not anybody. When he says, "I'd rather be Red than dead," he means it — but he doesn't mean any harm to anyone else.

It is most unfair that he should find himself trapped between two groups of fanatics, both of which are quite willing to cut throats between the soup and the entree with no loss of appetite.

But that's how it is. This is no world for wishful thinkers and our immediate future has almost no place for a pacifist in it. It's not fair at all, but your neighbor who now comes to your cocktail parties will, sometime before long, cut your throat.

He's a mean bastard and he just doesn't understand pacifists. He thinks they look better with their throats cut. And there are so many of him and so few of the People's Police that, chances are, he'll manage it — before the police get him.

It just...isn't...*fair*!

Perhaps this is a good time for me to stop and interpolate a statement on my own behalf. I have been forced to realize that, in the minds of many people — including some of you here tonight — I am a dirty war-mongering beast who wants to sprinkle fallout over innocent babes.

By the standards of antagonists I suppose the most I can plead is *nol contendere*.

Which is the same as pleading guilty.

Yes, I would rather risk fallout on innocent babies, with chuckly smiles and dimpled knees than see the United States of America surrender to this monstrous evil.

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But my wishes in the matter will not be consulted — and I am not indulging in wishful thinking tonight. I think our most probable future is surrender, without a fight. No radioactive fallout. Just slavery.

I happen to think that it is better to risk fallout for a baby than to risk slavery for it. But, again, my opinion won't be asked., I also think there are prices too high to pay to save the United States.

Conscription is one of them. Conscription is slavery — and I don't think that any people or nation has a right to save itself at the price of slavery for anyone — no matter what name it is called. We have had ,the draft for twenty years now; I think this is shameful. If a country can't save itself through the volunteer service of its own free people, then I say: Let the damned thing go down the drain!

I don't like suppression of the truth for any reason. I think the word "classified" stinks!

I do not think that a group of people is justified in locking up a human being. If! had my way, all jails and prisons would be torn down, utterly abolished!

I was not born with these opinions and I did not form them lightly. I say these things as a man who has, in the past, marked documents "Confidential" or "Secret," a man who has given orders to conscripts, as a man who has sentenced his fellow men to prison. I don't like any ofit.

All three of these things have to do with why I despise Communism — but I will mention only the factor I despise most. I hate Communism most for its cold-blooded murder of the *truth*!

"Pravda" doesn't mean "truth." Pravda means whatever serves the world Communist revolution.

Let me tell you how this works in practice.

Thanks to George Orwell the grisly idea of unpersons and revised history is well known. Perhaps some of you thought that he was exaggerating.

While in the U.S.S.R. I tried very hard to find some trace of John Paul Jones. This should have been easy, as his career is unique; he founded both the American Navy and the modern Russian Navy.

But John Paul Jones has been sunk without a trace. I asked about him repeatedly, not only from guides who supposedly are trained in Russian history — and who are trained in it, of the revised sort — but also of professors of history, curators of historical museums and such. Not one of them had ever heard of him, he's an unperson.

Kerensky — Dr. Kerensky was President of Russia after the Tsar was overthrown and before Lenin came along. He is still living, in Palo Alto. I was unable to find anything about Kerensky in any Russian museum. I asked about him, and yes, they had heard of him — and changed the subject. He is becoming an unperson...as soon as there is no one left alive who remembers him. All visible traces of him are gone.

Trotsky — Lenin and Trotsky were a team, like Khrushchev and Bulganin, in the early years of the U.S.S.R. While we were there the U.S.S.R. was holding a great Lenin celebration; among other exhibits were hundreds and hundreds of news photographs from the early days of Communist Russia. I looked them all over carefully trying to find Trotsky's unmistakable face, searching especially in group pictures of

the Central Committee, pictures of the various ministers on official, occasions.

Not one picture — Trotsky is an unperson. He exists only in the memories of those old enough to remember the early twenties.

In contrast, please note that Benedict Arnold, Aaron Burr, Jefferson Davis, Robert E. Lee, and other persons on the losing side in rebellions in our history are still in our history books.

I asked about several of the Russian heroes of WWII, such as Budonny and Timoshenko. Nobody knew or cared what had become of them — when a man drops out of the news in Russia, that's that.

Let me recount one recent news story as reported in the Soviet Union: the U-2 incident.

You all remember it. A U-2 plane piloted by a civilian employee of the CIA — an American spy — came down in some fashion near Sverdlovsk in Siberia...and this marked the end of four years of aerial spying conducted by the CIA.

But here's how we got the story. On 5 May last year Mrs. Heinlein and I were in Alma-Ata, Kazakhstan, in the Soviet Union. Alma-Ata is almost unbelievably remote — it. is in the middle of a restricted territory — slave camps and rocket launching sites in a vast semidesert — 3,000 miles inside the Iron Curtain, and a few miles from the Red China border. It is north of Sinkiang, north of Tibet, north of the Himalaya Mountains, northeast of Afghanistan, and almost exactly in the geometrical center of the great Asian land mass.

Not a good place to buy American newspapers.

However, we got the news orally, from a local Commie boss. Khrushchev made a speech that day and gave the official Communist version; this local boss ordered us into his office and gave it to, us.

An American military plane had been shot down at 65,000 feet while attempting to cross the Afghanistan frontier into the U.S.S.R. — and let that be a lesson to us. The first attempt had been nailed right at the border and that was what would happen to any other American military plane that tried such aggression.

Khrushchev's speech was for internal consumption only — and please note the discrepancies between what. was fed to the Russian people and what did happen. The incident now takes place 1,500 miles south of where it happened, right at the border. It is the first such incident, rather than the last of many, over four years. Soviet military might have smeared the attempt at once and at 65,000 feet. (We may never know how and why that plane reached. the ground.

But for a number of physical, engineering reasons, it was not shot down at 65,000 feet by rocket fire.)

This is how history is revised, ala Nineteen Eighty-Four.

Two days later we saw pictures of the supposed wreckage in *Komsomolskaya Pravda* — and I pointed out to our guide that a radio installation does not fall 65,000 feet and reach the ground without a mark on it. I merely made her angry — she insisted that their newspapers "never print anything but the truth — never!"

Shortly thereafter we were in Kiev, waiting for a plane. Some Americans there asked us where we had been, where we were going; Mrs. Heinlein told them that we were now going to Vilno — and in answer to more questions, she explained that Vilno was the capital of Lithuania, one of the Baltic republics taken over by the U.S.S.R. about twenty years earlier;

A Russian translator, a young woman about twenty-three, was in the waiting room some distance away; she overheard this and rushed over and butted in. With, shrill indignation she informed us and the others that Mrs. Heinlein was lying — that Lithuania had always been part of the Soviet Union!

Mrs. Heinlein shrugged and told her she was wrong and turned her back on her.

We went to Lithuania. Lithuania is a lovely country, very beautiful, and it had a very high native civilization and culture before the Communists came — Lithuania was far ahead of the barbaric giant east of it. It had its own literature and language and its industry was far ahead of that of the Soviet Union, especially its electrical industry.

A gentle, beautiful, and delightful place, even today — as long as you don't notice that all of the boss jobs there are held by Russians — not Lithuanians.

It is probably unnecessary to point out that the young woman was utterly mistaken and that Mrs. Heinlein was 100 percent correct — after all Lithuania lost its freedom so recently that the free Lithuanians — exiles and refugees — still maintain their national legation in Washington. The rape of Lithuania — and Estonia and Latvia, and the attempted rape of Finland — is still fresh in the minds of many of us and the facts are well and widely known throughout the world.

Except behind the Iron Curtain.

This is no accident, of course. On June 6th, 1941, after most elaborate preparations, the secret police swooped down and deported *all* of the Lithuanian national leaders of every sort — some 60,000 in a

country of less than 3,000,000 — and loaded them like cattle and shipped them east to such far-distant places as Kotlas and Vofkuta.

Thereafter it took about a year for the underground resistance to get organized.

However, it makes me solemnly proud to say that even this lopping off of all their leadership has not killed the Lithuanian spirit — they are *still* fighting and the Russian conquerors are still having an uneasy time of it. The Terror still shows in that country, a visitor can't miss it — whereas it doesn't show in Russia itself, nor even in the Ukraine. It is my guess that little Lithuania will never stop fighting its conquerors. I hope we do as well.

Since what happened to Lithuania is a preview of what will probably happen to us, let's stop a moment to see. just how utterly the truth has been raped concerning Lithuania. Lithuania was a nation, a people, and a culture when Russia was merely peasant villages, serfs ruled over by illiterate barbaric chieftains. In the fourteenth century the Lithuanian Empire stretched right across Europe, from the Baltic to the Black Sea, Danzig to Odessa, an area greater than France, Germany, and England today — and controlled all the trade routes. Russia wasn't even a country then; they were a bunch of local tribes all paying tribute to the Tatar Khanate in the south. But you won't learn this in Russia today!

But a small people — the Lithuanians were never numerous — has trouble maintaining its independence in a country having no natural barriers. In time, Poland, Germany, and Russia all fought over little Lithuania and Napoleon crushed through it twice. In 1795 the Tsar annexed it and held it for 123 years, to 1918, during which time the Tsars tried, with extreme harshness — and without success — to extinguish Lithuanian nationalism, language, and culture. They rubbed out the name "Lietuva" and lumped it in as part of "Northwest Territory." In 1863 the Russians exiled 9,000 Lithuanian leaders to Siberia and imported Russians to fill all government jobs, closed the Roman Catholic schools, and forbade the Lithuanian language to be printed or taught — and note how closely this resembles what the Communists have done to them this generation, and are still doing.

But neither the Tsars nor the Communists were successful; harsh measures merely stimulated the underground. The Lithuanians have been free during most of their history, they were free and independent only twenty-two years ago and they have not forgotten their great history. They have never stopped fighting, they are fighting tonight — somewhere in Lithuania right this moment, some Russian or some collaborator is having his throat cut.

But, far from being "always a part of the Soviet Union" Lithuania fought the Russian Communists during the disorders that followed the collapse of the Tsarist Empire — fought them to a standstill and the Soviets signed a peace treaty in 1920, guaranteeing to respect Lithuanian independence and promising to pay indemnities — these promises were worth what Communist promises always are worth; nevertheless Lithuania remained free until World War II, at which time, by a combination of pressure and trickery, the U.S.S.R. took them over without a light. How is it that this Russian girl in Kiev holds such a distorted view of history? The most ironical — and the most chilling — aspect of this incident was that she was *sincere*. She was certain that she was speaking the truth — and that Mrs. Heinlein was a liar, a capitalist, aggressor liar, intentionally spreading false stories about her beloved country.

How?

Well, in the first place people in the U.S.S.R. don't travel much — a trip such as most of you have made to come to this convention is impossible. A Soviet citizen has to use his passport and get a visa from the police to make a trip like that from Tacoma to Seattle. It is extremely unlikely that this young woman in Kiev had even been in Lithuania. She knows only what she is told — she knows less about her own country than I do, she's traveled less in it.

In the second place every word, every source of information available to her has been government controlled — books, magazines, television, radio, newspapers, *everything*. It is almost impossible to describe this; it has to be experienced — but it feels a little like being smothered in cotton wool. It is a very odd feeling and it overtakes one after only a few days in the Soviet Union. I can't describe it, put it over emotionally...but try to imagine a situation in which every textbook, novel, magazine, you name it, is published by the Government Printing Office, every editor is a political employee — and censor. Imagine, if you can, a situation in which fan magazines could not *possibly* be printed — putting out a fan mag would be a certain way to land in Siberia.

The effect on me of this atmosphere was such that when I first got outside I at once bought every newspaper and newsmagazine that I could lay hands on — French, American, British, German — and read them *all*, at once, thirstily.

This girl grew up under such conditions.

But the last and most important factor is that it starts so young. In the Soviet Union babies are placed in a kindergarten when they are only a few weeks old, while mom goes back to work.

Let me describe one. We visited the Forty Years of October Collective Farm, a large place with a school system, so they said, of 800 children — probably true since we were shown one of four schools on the farm and it did have about 200 kids in it.

We were taken into a kindergarten class, perhaps thirty boys and girls five or six years old — they had not yet learned to read. They gave a little performance for us — a little girl recited a poem, a little boy delivered a memorized prose recitation, the class sang a song. The children were healthy and clean and well dressed and happy and it was all very charming indeed, much like a parallel welcome to a visitor in one of our own kindergartens.

After we were outside and temporarily out of earshot of any of the local people, Mrs. Heinlein asked me if I had understood it; I admitted that I had caught only half a dozen words — I do not speak Russian — ordering a meal or directing a taxi driver is my outside limit.

"Well," she answered, "the little girl was reciting the life of Lenin, the little boy gave a speech about the Seven Year Plan, and the song the class sang was about how we must all fight to preserve our revolution."

And these were just little baby kids, who had not yet learned to read!

So let's not blame that young woman in Kiev. She was a nice, patriotic, earnest kid, saying what she honestly believed was the truth. I'm sorry that I was annoyed with her — as I certainly was! — even at the time the row took place. Given other circumstances, I'm sure I could be friends with her.

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I could never be friends with the Communist bosses who fed her these lies and who have made it impossible for her to learn the truth about Lithuania — or any other aspect of history. Their cold-blooded suppression of the truth is, in the long run, more damnable in its effects than anything else they have done.

About noon on May fifteenth, the day before the abortive Paris Summit Conference, Mrs. Heinlein and I were going downhill from the castle which dominates the lovely city of Vilno. Coming uphill were a dozen-odd Red Army cadets; we stopped and chatted, answered their questions, showed them our passports.

Presently one of them, who seemed to be in charge, asked us if we had heard about the new Russian spaceship?

No — we had been away from news lately. Tell us.

It just happened that morning — the cadet gave me lift-off time, perigee, apogee, period, and even *now* — he illustrated with a gesture — a Russian cosmonaut is circling the Earth!

All the other cadets nodded agreement to everything he said and sometimes added details.

I congratulated them on their country's wonderful scientific achievement — with a frozen smile and a sick feeling in my stomach. We talked a bit more about it, then they went on up the hill and we went down.

That afternoon we tried very hard to buy a copy of *Pravda*. None were available anywhere — and this is like not being able to buy the New York *Times* in New York City.

We tried to listen to the Voice of America — jammed more heavily than we had ever heard it jammed.

We did listen to the Voice of Moscow — Mrs. Heinlein told me that it did report the rocket — but just as one of the sputniki, no mention of a passenger.

That evening our guide joined us to go to the ballet and she immediately told us that the cadet had been mistaken, it was not a rocket ship with a man in it — just a dummy. The cadet had misunderstood.

Well, perhaps so...but, if so, all those dozen or more cadets were mistaken exactly the same way.

Remember the date, May fifteenth. This is the rocket on which they admitted, a few days later, having trouble with the retrojets; they fired in the wrong attitude and they could not bring it down. It is also the one concerning which the New York *Herald-Tribune* published the cartoon: "Dummy to base! What's this about 'not returning'?"

That rocket is still up there, it may have passed overhead while we ate dinner. Is there a dead Russian in it? Is there an "unperson" in the sky?

*I* don't know. Under the Communist system it is never possible to get the facts. The truth is dead — .murdered — and the official version, the pravda, is that which advances the world Communist revolution.

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But I wonder what our own history will be, say fifty years from now? Will it turn out that there never was a Cold War, never was a Korean War — and that the United States and other free countries

voluntarily joined up as people's republics immediately after Mother Russia's glorious and unassisted victory in the Great Patriotic War of 1940-45? Will Plymouth Rock and Jamestown be dropped out of history books in favor of the Russian colonies which (in fact existed in California and Alaska?)

## Omitted Articles

**Guest of Honor Speech--Rio De Janeiro Movie Festival, 1969**

**Guest of Honor Speech at the XXXIVth World Science Fiction Convention—Kansas City, 1976**

**Part II—National Air and Space Museum Heinlein Retrospective—6 October 1988**

**NASA Medal for Distinguished Public Service for Robert A. Heinlein**

# This I Believe

"I am not going to talk about religious beliefs but about matters so obvious that it has gone out of style to mention them. I believe in my neighbors. I know their faults, and I know that their virtues far outweigh their faults. "Take Father Michael down our road a piece. I'm not of his creed, but I know that goodness and charity and loving kindness shine in his daily actions. I believe in Father Mike. If I'm in trouble, I'll go to him."

"My next-door neighbor is a veterinary doctor. Doc will get out of bed after a hard day to help a stray cat. No fee — no prospect of a fee — I believe in Doc.

"I believe in my townspeople. You can know on any door in our town saying, 'I'm hungry,' and you will be fed. Our town is no exception. I've found the same ready charity everywhere. But for the one who says, 'To heck with you — I got mine,' there are a hundred, a thousand who will say, "Sure, pal, sit down."

"I know that despite all warnings against hitchhikers I can step up to the highway, thumb for a ride and in a few minutes a car or a truck will stop and someone will say, 'Climb in Mac — how far you going?'

"I believe in my fellow citizens. Our headlines are splashed with crime yet for every criminal there are 10,000 honest, decent, kindly men. If it were not so, no child would live to grow up. Business could not go on from day to day. Decency is not news. It is buried in the obituaries, but is a force stronger than crime. I believe in the patient gallantry of nurses and the tedious sacrifices of teachers. I believe in the unseen and unending fight against desperate odds that goes on quietly in almost every home in the land.

"I believe in the honest craft of workmen. Take a look around you. There never were enough bosses to check up on all that work. From Independence Hall to the Grand Coulee Dam, these things were built level and square by craftsmen who were honest in their bones.

"I believe that almost all politicians are honest. . .there are hundreds of politicians, low paid or not paid at all, doing their level best without thanks or glory to make our system work. If this were not true we would never have gotten past the 13 colonies.

"I believe in Rodger Young. You and I are free today because of endless unnamed heroes from Valley Forge to the Yalu River. I believe

in — I am proud to belong to — the United States. Despite shortcomings from lynchings to bad faith in high places, our nation has had the most decent and kindly internal practices and foreign policies to be found anywhere in history.

"And finally, I believe in my whole race. Yellow, white, black, red, brown. In the honesty, courage, intelligence, durability, and *goodness* of the overwhelming majority of my brothers and sisters everywhere on this planet. I am proud to be a human being. I believe that we have come this far by the skin of our teeth. That we *always* make it just by the skin of our teeth, but that we will always make it. Survive. Endure. I believe that this hairless embryo with the aching, oversize brain case and the opposable thumb, this animal barely up from the apes will *endure*. Will *endure* longer than his home planet — will spread out to the stars and beyond, carrying with him his honesty and his insatiable curiosity, his unlimited courage and his noble essential decency.

"This I believe with all my heart."

Robert A. Heinlein wrote this item in 1952. His wife, Virginia Heinlein,

chose to read it when she accepted NASA's Distinguished Public Service

Medal on October 6, 1988, on the Grand Master's behalf (it was a posthumous

award).

Mrs. Heinlein received a standing ovation.

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## Omitted Articles

**Speeches by the Panelists:**

**Tom Clancy**

**L. Sprague de Camp**

**Jerry Pournell**

**Charles Sheffield**

**Jon McBride**

**Speeches by the Special Guests:**

**Catherine Crook de Camp**

**Tetsu Yano**

**Part III—Tributes to Robert A. Heinlein**

**Poul Anderson—RAH: A Memoir**

**Jim Baen—Jim Baen's RAH Story**

**Greg Bear—Remembering Robert Heinlein**

**J. Hartley Bowen, Jr.—Recalling Robert Anson Heinlein**

**Arthur C. Clarke—Robert Heinlein**

**Joe Haldeman—Robert A. Heinlein and Us**

**Larry Niven—The Return of William Proxmire**

**Spider Robinson—Rah Rah R.A.H.!**

**Spider Robinson—Robert**

**Robert Silverberg—Heinlein**

**Harry Turtledove—Thank You**

**Jack Williamson—Who Was Robert Heinlein?**

**Yoji Kondo and Charles Sheffield—Farewell to the Master**

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## Dance Session

(June 1946)

The squeegeed ice in the great dim hall
Was clean and blue and fit for the ball;
So the music sounded and the lights glared out
And the cruel steel blades went swirling about
In flight fantastic and fancy free,
In crisp, clean spins, with gutsy glee—

Etching the ice with outre art,
While the cruel bright blades sliced sharp in my heart
Out of the leaping rushing spate
A voice sang out for a three-lobed eight;
The Ice fauns paired with their elfin sprites
To start their intricate woven rites.

In complex, structured demonstration
They captured Art in one equation;
In sweet incredible enthymeme
They proved the logic of cold Moon beam.
Out form the pattern of Killian and Blues
Emerged the sprite whom the Ice Gods choose

To show us weary earth-bound creatures
The cool, sweet lines of Beauty's features.
Rosy her long limbs, snow white were her gants,
Rime blue was her jerkin, and merry her glance—
Hoyden her hair bow, among the gallants.

Ice fairy Virginia, First in the Dance!

(Oh, great was the shock of the sudden stop
When the music ceased and the patterns broke
And fairyland melted in cigarette smoke
In the warm dull light of a coffee shop!)

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**The End**